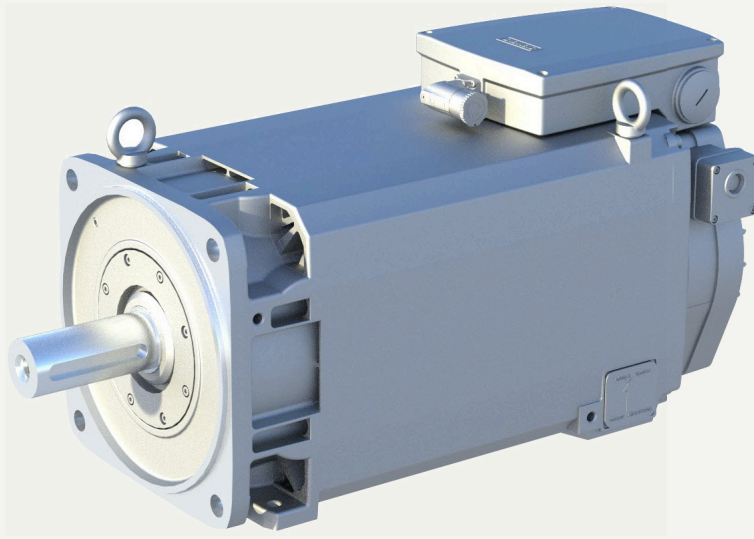




Basım

09/2021

İŞLETME KILAVUZU

SIMOTICS

Ana motorlar SIMOTICS M-1PH8

1PH808/1PH810

www.siemens.com

SIEMENS

SIMOTICS

Sürücü teknolojisi Ana motorlar 1PH808_1PH810

İşletme kılavuzu

Giriş

Temel güvenlik uyarıları

1

Açıklama

2

Uygulama ön hazırlığı

3

Mekanik montaj

4

Bağlantı

5

Devreye alma

6

İşletim

7

Bakım

8

Yedek parçalar

9

Devre dışı bırakma ve
bertaraf etme

10

Ek

A

09/2021

A5E50030759G AC

Yasal bilgi ve uyarılar

İkaz bilgisi konsepti

Bu kullanma kılavuzu, kendi güvenliğiniz ve mal kaybı veya zarar oluşmasını önlemek için dikkat etmeniz gereken bilgi ve uyarılar içermektedir. Kişisel güvenliğiniz ile ilgili bilgi ve uyarılar bir ikaz üçgeni ile belirtilmiştir, genel mal hasarı ile ilgili bilgi ve uyarılar için ise ikaz üçgeni kullanılmamıştır. Tehlike kademesine bağlı olarak, ikaz bilgi ve uyarıları, en önemliden daha az önemlilere göre, aşağıdaki şekilde sıralanmıştır.

 TEHLİKE
eğer bildirilen dikkat etme önlemlerine uyulmazsa, ölüm veya ağır yaralanma olacağı anlamına gelir.
 İKAZ
eğer bildirilen dikkat etme önlemlerine uyulmazsa, ölüm veya ağır yaralanma olabileceği anlamına gelir.
 DİKKAT
eğer bildirilen dikkat etme önlemlerine uyulmazsa, hafif yaralanma olabileceği anlamına gelir.
DİKKAT
eğer bildirilen dikkat etme önlemlerine uyulmazsa, mal hasarı olabileceği anlamına gelir.

Birden fazla tehlike derecesinin aynı anda ortaya çıkması halinde, en yüksek tehlike derecesine ait uyarı bilgisi kullanılır. Eğer ikaz üçgenli bir uyarı bilgisinde insanlara zarar gelebileceği hususuna dikkat çekiliyorsa, aynı ikaz bilgisine ayrıca bir mal hasarı ile ilgili uyarı da eklenmiş olabilir.

Yetkili personel

Bu dokümantasyon içinde açıklanan ürünü/sistemi sadece ilgili görev için uygun nitelikte olan **kalifiye personel** kullanabilir. Ürünün/Sistemin kullanımı esnasında ilgili göreve ilişkin dokümantasyona ve özellikle bu dokümantasyon içinde belirtilen güvenlik ve uyarı bilgilerine dikkat edilecektir. Kalifiye personel, gerekli eğitime ve deneyime sahip olduğundan bu ürünleri/sistemleri kullanırken riskleri fark edebilecek ve olası tehlikeleri önleyebilecek bilgiye sahiptir.

Siemens ürünlerinin amaca uygun kullanımı

Lütfen şunlara dikkat ediniz:

 İKAZ
Siemens ürünleri sadece katalogta ve ilgili teknik dokümantasyonda öngörülmüş kullanım durumları için kullanılmalıdır. Eğer yabancı ürünler ve yabancı bileşenler kullanılırsa, bu ürün ve bileşenler Siemens tarafından tavsiye edilmiş ya da kullanımına izin verilmiş olmalıdır. Ürünlerin kusursuz ve güvenli kullanımı için, gerektiği şekilde taşınması, gerektiği şekilde depolanması, yerleştirilmesi, montajı, kurulması, devreye sokulması, kullanılması ve muhafaza edilmesi ya da onarılması şarttır. İzin verilen çevre koşullarına uyulmalıdır. İlgili dokümantasyonlarda verilen bilgi ve uyarılara dikkat edilmelidir.

Markalar

Tescil ibaresi ® ile işaretlenmiş tüm isim ve tanımlar, tescil edilmiş Siemens AG markalarıdır. Bu yazıdaki diğer isim ve tanımlar, üçüncü kişiler tarafından kendi amaçları için kullanılmaları halinde sahiplerinin haklarına tecavüz edilmiş olması söz konusu olabilecek markalar olabilir.

Sorumluluk üstlenmeme mesuliyeti

Bu yazının içeriğini, tarif edilen donanım ve yazılıma uygunluğu açısından kıyasladık. Yine de farklılıklar ve sapmalar olabilir ve bu nedenle tamamen uyumluluk hususunda herhangi bir sorumluluk üstlenmiyoruz ve garanti vermiyoruz. Bu yazıda verilen bilgiler muntazam aralıklar ile kontrol edilmektedir ve gerekli düzeltmeler yazının müteakip baskılarına işlenmektedir.

Giriş

Belgeleri güvenli bir şekilde saklama

Bu belgelerin, kolay ulaşabilecekleri ve sorumlusu personelin kullanımına sunulabilecekleri bir yerde saklanması gerekir.

Hedef kitle

Bu işletme kılavuzu, elektrikçiler, makine tamir ustaları, servis teknisyenleri ve depo personeli için hazırlanmıştır.

Bu işletme kılavuzu hakkında

Bu işletme kılavuzu, 1PH808 ve 1PH810 motorunu tarif eder ve size teslimden bertarafı kadar motoru kullanma hakkında bilgi verir.

- Motorla çalışmaya başlamadan önce bu işletme kılavuzunu okuyun. Böylece motorun tehlikesiz ve sorunsuz bir şekilde ve uzun süre çalışmasını sağlarsınız.

Mevcut işletme kılavuzu, söz konusu Siemens projelendirme elkitabıyla bağlantılı olarak geçerlidir.

Siemens, bu işletme kılavuzundaki bilgilerin kalitesini sürekli daha iyi yapmak için uğraşırız.

- Hatalarla ilgili uyarılarınız veya iyileştirme teklifleriniz olduğunda lütfen Siemens servis merkezine başvurun.
- Bu işletme kılavuzundaki, özellikle patlama korumasıyla ilgili güvenlik uyarılarına her zaman uyun.

İkaz bilgileri tasarımı, iç başlık kısmının arka yüzünde açıklanmıştır.

Metin işlevleri

Kendi güvenliğinizi sağlamak ve maddi hasarları önlemek için uymanız gereken uyarılara ek olarak, bu belgede aşağıdaki metin işlevlerini de bulabilirsiniz:

İşletme kılavuzu

Başlangıçları "Yöntem" sözcüğüyle belirtilen, belirlenen sıradaki davranış talimatları. Münferit kullanım adımları numaralandırılmıştır.

1. Davranış talimatlarını belirtilen sıraya göre uygulayın.



Kutucuk, davranış talimatının sonuna işaret eder.

Sıra belirtilmeyen davranış talimatları bir sıralama işaretiyle işaretlenmiştir:

- Davranış talimatlarını uygulayın.

Sıralamalar

- Sıralamalar, ek simgeler olmaksızın bir sıralama işaretiyle işaretlenmiştir.
 - İkinci düzeydeki sıralamalar bir ara çizgiyle işaretlenmiştir.

Uyarılar

Uyarılar aşağıdaki şekilde gösterilmiştir:

Not

Bir bilgi veya uyarı, ürün hakkında, ürünün kullanımı hakkında veya dokümantasyonun ilgili bölümü hakkında önemli bir bilgidir. İlgili bilgi size yardımcı olur veya ek fikirler verir.

Daha fazla bilgi için bakınız

Aşağıdaki link üzerinden aşağıdaki konulara yönelik bilgilere ulaşabilirsiniz:

- Sipariş belgeleri/belgelere genel bakış
- Dokümanların indirilmesi için gerekli ek linkler
- Dokümantasyonu çevrimiçi olarak kullanın (kılavuzları/bilgileri bulun ve arayın)

Daha fazla bilgi için bakınız (<https://support.industry.siemens.com/cs/de/en/view/108998034>)

Teknik belgelerle (örn. öneriler, düzeltmeler) ilgili sorularınız olduğunda lütfen aşağıdaki adrese E-posta (<mailto:docu.motioncontrol@siemens.com>) bir e-posta gönderin.

mySupport

Kapsamlı yardımları ve daha ayrıntılı bilgileri aşağıdaki bağlantıdan bulabilirsiniz:

Destek Bağlantılarım ve Araçlarım (<https://support.industry.siemens.com/my/ww/en/documentation>)

Kişisel kitaplığınızı, örneğin dokümantasyonunuz için Siemens içerikleri temelinde özel olarak derleyebilir ve kendi makine dokümantasyonunuza uyarlayabilirsiniz.

Bunun için "Belgelerim" üzerine tıklayın.

Not

Bu fonksiyonu kullanmak istiyorsanız, bir defalığına kaydolmalısınız.

Daha sonra verilerinizle oturum açabilirsiniz.

Kendi kişisel kitaplığınızı "mySupport" altında aşağıdaki şekilde oluşturabilirsiniz.

Ön koşul

"Siemens Industry Online Support" (aşağıda "SIOS" olarak anılacaktır) altında kaydoldunuz ve oturum açtınız.

SIOS (<https://support.industry.siemens.com/cs/ww/en/>)

Bu şekilde kişisel bir kitaplık oluşturursunuz

1. SIOS'u açın ve oturum açın.
2. Aradığınız ürünü, "Ürün bilgilerini ara" altına girin ve giriş tuşuna basın.
3. "Giriş tipi" altından istediğiniz belge sınıfını seçin, örneğin "manuel".
4. Girişlerin altında istediğiniz elkitabına tıklayın.
5. "mySupport belgelerine ekle" tuşuna tıklayın.
6. Bir başlık girin.
7. "Normal" tuşuna basın.



Seçilen elkitabını "mySupport" altında bulabilirsiniz. Diğer işlevleri bulmak için, belgenin sağındaki simgeye tıklayın.

Bu şekilde kendi kitaplığınızı oluşturabilir ve belgelerinize hızlı bir şekilde erişebilirsiniz.

Eğitimler

Aşağıdaki bağlantıdan, Siemens'in ürünler, sistemler ve otomasyon tekniği çözümleri için sunduğu SITRAIN eğitimleri hakkında bilgi edinebilirsiniz:

SITRAIN (<http://siemens.com/sitrain>)

Teknik destek

Teknik sorularınız olduğunda Teknik Destek (<https://support.industry.siemens.com/cs/ww/en/>) ile iletişime geçin.

Bir destek talebi oluşturmak için aşağıdaki adımları izleyin:

Ön koşul

"Siemens Industry Online Support" (kısaca "SIOS") altında kaydoldunuz ve oturum açtınız.

SIOS (<https://support.industry.siemens.com/cs/ww/en/>)

Prosedür

1. "Doğrudan destek talebine git" üzerine tıklayın veya Destek talebi (<https://support.industry.siemens.com/cs/ww/en/my>) bağlantısını izleyin
2. Çevrimiçi formdaki talimatlara uyun.



Yabancı web siteleri

Bu kitapçıkta yabancı web sitelerinin tıklanabilir bağlantıları vardır. Siemens, bu tür web sitelerinin içerikleri için hiçbir sorumluluk kabul etmez ve bu web sitelerinin veya içeriklerinin hiçbirini kendisininmiş gibi göstermez, çünkü Siemens, bu web sitelerindeki bilgileri kontrol edemez ve burada sunulan içerik ve bilgilerden sorumlu değildir. Bu tür web sitelerini kullanma riski kendinize aittir.

Ürünlere yönelik internet adresi

Ürünler (<http://www.siemens.com/motioncontrol>)

İçindekiler

	Giriş.....	3
1	Temel güvenlik uyarıları	11
1.1	Genel güvenlik uyarıları	11
1.2	Elektrik alanları veya elektrostatik deşarj nedeniyle cihaz hasarı	16
1.3	Security (güvenlik) notları	16
1.4	Tahrik sistemlerindeki (Power Drive Systems) diğer riskler	18
2	Açıklama	19
2.1	Amacına uygun kullanım.....	19
2.2	Teknik özellikler ve ortam koşulları	20
2.2.1	Direktifler ve standartlar.....	20
2.2.2	Teknik Özellikler	22
2.2.3	Ortam koşulları	22
2.2.4	Koruma tarzı	23
2.2.5	Gürültü emisyonu	23
2.3	Güç levhası bilgileri (tip levhası)	25
2.4	Montaj.....	26
2.4.1	Yapılar	26
2.4.2	Soğutma.....	27
2.4.3	Durdurma freni (seçenek)	30
2.4.3.1	Özellikler	30
2.4.3.2	SH 80 ve SH 100 için durdurma frenini takma	34
3	Uygulama ön hazırlığı.....	35
3.1	Sevk ve ambalaj	35
3.2	Nakliye ve depolama	35
3.2.1	Nakliye	36
3.2.2	Depolama	39
4	Mekanik montaj.....	41
4.1	Kurulum	41
4.2	Sabitleme	42
4.3	Tahrik elemanlarının takılması	43
4.4	Millerin doğrudan tahriki olarak montaj.....	45
4.5	"Premium performans" yatak modelindeki dengeleme	50
4.6	Titreşim karakteristiği.....	55
4.7	Döner girişleri 1PH8 içi boş mil motorlarına takma	56
4.7.1	Rotorla taşınan döner giriş.....	60
4.7.2	Yataksız, mahfazayla taşınan döner giriş	64

4.7.3	Takma notları	68
4.7.4	Yataksız, mahfazayla taşınan döner girişler için adaptör teklifi	71
5	Bağlantı.....	73
5.1	Su soğutmasının mekanik bağlantısı	73
5.2	Elektrik bağlantısı.....	73
5.2.1	Kablo girişi ve hat döşeme.....	74
5.2.2	Devre şeması	75
5.2.3	Terminal kutusu	76
5.2.4	Güç soketi.....	80
5.2.5	Elektrik bağlantısı için veriler	80
5.2.6	DRIVE-CLiQ arabirimli motorlar	81
5.2.7	DRIVE-CLiQ arabirimi olmayan motorlar	82
5.2.8	HTL artış vericiyi bağlama.....	84
5.2.9	Sıcaklık sensörünün (sezici) bağlanması	85
5.2.10	Topraklama iletkenini bağlantı kutusuna bağlama.....	85
5.2.11	1PH808 için harici fanı bağlama	86
5.2.12	1PH810 için harici fanı bağlama	88
5.2.13	Bir konvertöre bağlantı	91
5.2.14	Durdurma frenini bağlama (seçenek).....	92
5.2.15	Kapatma havası bağlantısı (seçenek Q12)	92
6	Devreye alma	95
6.1	Çalıştırmayla ilgili güvenlik uyarıları	95
6.2	Devreye almayla ilgili kontrol listeleri	97
6.3	"Premium performans" yatak modeli.....	100
6.4	İzolasyon direncinin kontrolü.....	101
6.5	Kolay açma ve kapatma.....	102
6.6	Soğutma.....	103
7	İşletim	105
7.1	Arızalar	106
7.2	Çalıştırma araları	108
8	Bakım	109
8.1	Denetim ve bakım	109
8.1.1	Genel denetim verileri.....	109
8.1.2	Bakım ve denetim aralıkları	110
8.1.3	İlk kontrol	111
8.1.4	Ana denetim	111
8.1.5	Yatak değiştirme öneli.....	112
8.1.6	"Premium performans" yatak modeli.....	114
8.1.7	Motoru ve fanı temizleme (harici fan).....	115
8.1.8	Verici değişikliği	117
8.2	Onarım	117
8.2.1	Motoru sökme/takma	117
8.2.2	Devir sayısı vericisini sökme/takma	118
8.2.3	Pinyon vericisini sökme/takma.....	120

8.2.4	DRIVE-CLiQ ara biriminin değiştirilmesi (sensör modülü)	122
8.2.5	Cıvata bağlantılarının sıkma torkları (momentleri).....	123
8.2.6	Durdurma frenini sökme/takma (seçenek)	123
9	Yedek parçalar	125
10	Devre dışı bırakma ve bertaraf etme	129
10.1	Devre dışı bırakma	129
10.2	Atığa ayırma	130
A	Ek	131
A.1	Durdurma freni uyarısı	131
A.2	Durdurma freninin işletme kılavuzu	132
A.3	SH 80 model harici fanın işletme kılavuzu	162
A.3.1	W2S135FA7905 model harici fanın işletme kılavuzu	162
A.3.2	W2S135FA7907 model harici fanın işletme kılavuzu	173
A.3.3	W2S135FA8309 model harici fanın işletme kılavuzu	184
A.3.4	W2S135FA8311 model harici fanın işletme kılavuzu	195
A.3.5	W2S135FB1106 model harici fanın işletme kılavuzu	206
A.3.6	W2S135FB1108 model harici fanın işletme kılavuzu	217
A.3.7	W2S135FB5910 model harici fanın işletme kılavuzu	228
A.3.8	W2S135FB5912 model harici fanın işletme kılavuzu	240
A.4	SH 100 model harici fanın işletme kılavuzu	252
A.4.1	W2D155FA0806 model harici fanın işletme kılavuzu	252
A.4.2	W2D155FA0808 model harici fanın işletme kılavuzu	264
A.4.3	W2D155FB0805 model harici fanın işletme kılavuzu	276
A.4.4	W2D155FB0807 model harici fanın işletme kılavuzu	288
	Endeks	301

Temel güvenlik uyarıları

1.1 Genel güvenlik uyarıları



İKAZ

Diğer enerji kaynakları nedeniyle elektrik çarpması tehlikesi ve hayati tehlike

Gerilim altındaki parçalara temas etmeniz ölüm veya ağır yaralanma ile sonuçlanabilir.

- Yalnızca gerekli yetkinliğe sahipseniz elektrikli cihazlar üzerinde çalışma gerçekleştiriniz.
- Çalışmalar sırasında ülkeye özgü güvenlik kurallarına uyunuz.

Güvenliğin sağlanması için genel olarak şu adımlar geçerlidir:

1. Devre dışı bırakma için hazır olunmalıdır. İşlemle ilgili olan tüm kişiler bilgilendirilmelidir.
2. Tahrik sistemi gerilimsiz duruma getirilmeli ve tekrar çalışmaya karşı emniyete alınmalıdır.
3. Uyarı levhalarında belirtilen deşarj süresi kadar bekleyiniz.
4. Tüm güç bağlantıları birbirlerine ve koruyucu iletken bağlantısına karşı gerilim akışı kesilmesi bakımından kontrol edilmelidir.
5. Mevcut yardımcı gerilim devrelerinin gerilimsiz durumda olup olmadığını kontrol ediniz.
6. Motorların hareket edemiyor olduğundan emin olunuz.
7. Diğer tüm enerji kaynaklarını tanımlayınız, örn. basınçlı hava, hidrolik veya su. Enerji kaynakları güvenli bir duruma getirilmelidir.
8. Doğru tahrik sisteminin tamamen kilitletiğinden emin olunmalıdır.

Çalışmalar tamamlandıktan sonra, tersi sırayla devam ederek çalışmaya hazır olma durumunu tekrar elde ediniz.



İKAZ

Uygun olmayan bir akım beslemesi bağlantısında elektrik çarpması tehlikesi söz konusudur

Uygun olmayan bir akım beslemesi bağlantısı durumunda, temas edilen parçalar tehlikeli gerilim altında bulunabilir. Tehlikeli gerilimle temas, ağır yaralanmalara ve ölüme neden olabilir.

- Elektronik yapı gruplarındaki tüm bağlantılar ve terminaller için yalnızca SELV (SELV = Safety Extra Low Voltage - Güvenlik Ekstra Düşük Gerilim) veya PELV (PELV = Protective Extra Low Voltage - Koruyucu Ekstra Düşük Gerilim) çıkış gerilimleri sunan akım beslemeleri kullanınız.



! İKAZ

Hasarlı motorlar veya sürücüler nedeniyle elektrik şoku

Motorların veya cihazların hatalı kullanımı, bunlara zarar verebilir.

Hasarlı motorlarda veya cihazlarda, muhafazalarında veya açıkta bulunan bileşenlerde tehlikeli voltajlar bulunabilir.

- Taşıma, saklama ve çalışma sırasında teknik veriler içerisinde belirtilen limit değerlere uyum sağlandığından emin olun.
- Hasarlı bir motoru veya cihazı kullanmayın.



! İKAZ

Hat blendajının takılmamış olması elektrik çarpmasına neden olabilir

Kapasitif aşırı örtüşme nedeniyle hat yalıtım kılıfları takılmadığında hayati tehlike yaratacak temas gerilimleri oluşabilir.

- Hat yalıtım kılıflarını ve kullanılmayan güç hattı tellerini (örneğin fren telleri) en azından bir taraftan topraklanmış gövde potansiyeline bağlayınız.



! İKAZ

Topraklamanın eksik olması elektrik çarpmasına neden olabilir

Koruma sınıfı I olan cihazlarda topraklama hattı bağlantısının eksik veya yanlış yapılması nedeniyle gövdede veya açıktaki parçalarda tehlikeli gerilimler mevcut olabilir, bunlarla temas edilmesi ağır yaralanmalara veya ölüme neden olabilir.

- Cihazı usulüne uygun biçimde topraklayınız.



! İKAZ

İşletim sırasında fiş-priz bağlantısı ayrılırsa elektrik arkı söz konusu olabilir

İşletim sırasında bir fiş-priz bağlantısı ayrılırsa, elektrik arkı ortaya çıkabilir ve ağır yaralanmalara veya ölüme neden olabilir.

- İşletim sırasında ayrılmasına açık biçimde izin verilmiş olanlar hariç, fiş-priz bağlantıları sadece gerilimsiz durumdayken ayrılmalıdır.

DİKKAT

Gevşek güç bağlantıları nedeniyle maddi hasarlar

Sıkma torklarının yetersiz olması veya titreşimler, güç bağlantılarının gevşemesine neden olabilir. Bu nedenle yangınlar, cihaz arızaları veya fonksiyon arızaları ortaya çıkabilir.

- Tüm güç bağlantıları öngörülen sıkma torkuyla sıkılmalıdır.
- Tüm güç bağlantıları düzenli aralıklarla kontrol edilmelidir, özellikle bir nakliye sonrasında.

DİKKAT

Uygun olmayan vidalama takımları nedeniyle cihaz hasarı

Uygun olmayan vidalama takımları veya uygun olmayan vidalama yöntemleri cihazın vidalarına hasar verebilir.

- Vidalama kafasına tamamen uyum vidalama tahrikleri kullanın.
- Vidaları teknik dokümantasyonda belirtilen torkla sıkın.
- Bir tork anahtarı veya dinamik tork sensörü ve devir sınırlamasına sahip mekanik bir hassas tornavida kullanın



İKAZ

Telsiz cihazları veya mobil telefonlar nedeniyle beklenmeyen makine hareketi

Bileşenlerin hemen yanında telsiz cihazlar veya mobil telefonlar kullanılırsa cihaz arızalanabilir. Bu fonksiyon arızaları makinenin çalışma güvenliğini etkileyebilir ve kişiler için yaralanma veya maddi hasar tehlikesi ortaya çıkabilir.

- İlgili bileşenlerin 20 cm yakınına gelmeniz durumunda, telsiz cihazları veya mobil telefonlar kapatılmalıdır.
- "SIEMENS Industry Online Support App" (SIEMENS Industry online destek uygulaması) sadece cihaz kapalıyken kullanılmalıdır.



İKAZ

Eksik veya okunmayan uyarı levhaları nedeniyle olası tehlikeler hakkında bilgi sahibi olunamaz

Eksik veya okunmayan uyarı levhaları tehlikeleri öngörememenize neden olabilir. Öngörülemeyen tehlikeler, ağır yaralanmalara veya ölüme neden olan kazalara yol açabilir.

- Dokümantasyon yardımıyla uyarı levhalarının eksiksiz olup olmadığını kontrol ediniz.
- Eksik uyarı levhaları ilgili bileşenlere yerleştirilmelidir, gerekirse ilgili ülke dilinde.
- Okunmayan uyarı levhalarını değiştiriniz.



İKAZ

Aktif olmayan güvenlik fonksiyonları nedeniyle beklenmeyen makine hareketi

Aktif olmayan veya ayarlanmamış güvenlik fonksiyonları beklenmeyen makine hareketlerini tetikleyebilir ve bunun neticesinde ağır yaralanmalar veya ölümler söz konusu olabilir.

- İşletmeye alma işleminden önce ilgili ürün dokümantasyonundaki bilgileri dikkate alınız.
- Güvenlikle ilişkili fonksiyonlar için tüm güvenlik ilişkili bileşenleri de içeren tüm sisteme yönelik bir güvenlik değerlendirmesi yürütünüz.
- Uygulanan güvenlik fonksiyonlarının sizin tahrik ve otomasyon görevlerinize uygun ve devrede olduğunu, ilgili parametreleştirme ile güvenceye alınız.
- Fonksiyon testi yapınız.
- Güvenlikle ilgili fonksiyonların doğru iş akışlarını sağladığınızdan emin olmadan önce sisteminizde gerçek üretime geçmeyiniz.

Not

Safety Integrated fonksiyonları için önemli güvenlik uyarıları

Safety Integrated fonksiyonlarını kullanmak istiyorsanız, Safety Integrated el kitaplarındaki güvenlik uyarılarına uyunuz.



İKAZ

Elektromanyetik alanlar nedeniyle aktif implantların etkilenme tehlikesi

Transformatörler, dönüştürücüler veya motorlar gibi elektrikli enerji tekniği sistemlerinin işletilmesi esnasında elektromanyetik alanlar (EMF) oluşur. Özellikle kalp piline veya implantlara sahip kişiler sistemlerin çok yakınında bulunduğu onlar için bu durum tehlike arz eder.

- Bu uyarı sizi kapsıyorsa ilgili motorlardan "Amacına uygun kullanım" bölümünde bahsedilen mesafeler kadar uzak durun.



İKAZ

Sabit mıknatıslı alanlar sebebiyle aktif implant arızaları

Kapanmış olsalar bile sabit mıknatıslı elektrik motorları, konvertörlere/motorlara yakın olmaları durumunda kalp cihazları veya implantlara sahip kişiler için potansiyel risk oluşturabilir.

- Bu sizi etkiliyorsa, bu gibi ekipmanlardan "Kullanım amacı" bölümünde belirtilen minimum mesafeyi koruyun.
- Sabit mıknatıslı motorları taşıırken veya saklarken her zaman uyarı etiketleri takılmış şekilde orijinal paketleme malzemelerini kullanın.
- Saklama yerlerini uygun uyarı etiketleri ile net bir şekilde işaretleyin.
- Hava ile taşıma durumunda IATA düzenlemelerine uyulmalıdır.



İKAZ

Hareketli veya fırlayan parçalar nedeniyle yaralanma

Çalışma sırasında hareketli motor parçalarına veya sürücü çıkış parçalarına ve dışarı fırlamış gevşek motor parçalarına temas edilmesi (örn. düz kamalar) ciddi yaralanma veya ölüme neden olabilir.

- Gevşek parçaları çıkarın veya dışarı fırlamayacak şekilde sabitleyin.
- Hareketli parçalara dokunmayın.
- İlgili güvenlik korumalarını kullanarak tüm hareketli parçaları koruyun.



İKAZ

Yetersiz soğutma nedeniyle yangın

Yetersiz soğutma motorun aşırı ısınmasına ve neticede duman ve yangın sonucunda ölüm veya ciddi yaralanmalara neden olabilir. Bu aynı zamanda daha fazla arıza ve motorlarda daha kısa servis ömrü ile sonuçlanır.

- Motor için belirlenen soğutma sıvısı gereksinimlerine uyun.



İKAZ

Motorun yanlış çalıştırılması nedeniyle yangın

Hatalı çalıştırıldığında ve bir arıza olması durumunda, motor ısınarak yangın ve dumana neden olabilir. Bu ciddi ayarlanma veya ölçümle sonuçlanabilir. Ayrıca, aşırı yüksek sıcaklıklar motor parçalarına zarar verir ve daha fazla arızaya ve motorlarda kısa kullanım ömrüne neden olabilir.

- Motoru ilgili teknik özelliklere uygun şekilde çalıştırın.
- Motorları sadece etkin sıcaklık izleme ile birlikte çalıştırın.
- Aşırı yüksek sıcaklık meydana gelirse motoru hemen kapatın.



DİKKAT

Sıcak yüzeylerin neden olduğu yanık tipi yaralanmalar

Çalışma sırasında, motor yüksek sıcaklıklara ulaşabilir, buda dokunulduğunda yanıklara sebep olur.

- Çalışma sırasında ulaşamayacak şekilde motoru monte edin.

Bakım gerektiğinde alınacak önlemler:

- Herhangi bir çalışmaya başlamadan önce motorun soğumasına izin verin.
- Uygun personel koruyucu ekipman kullanın, örn. eldivenler.

1.2 Elektrik alanları veya elektrostatik deşarj nedeniyle cihaz hasarı

Elektrostatik tehlike altındaki yapı elemanları (EGB), elektrostatik alanlar veya elektrostatik boşalmalar nedeniyle hasar görebilecek münferit yapı parçaları, entegre devreler, yapı grupları ve cihazlardır.



DİKKAT

Elektrik alanları veya elektrostatik deşarj nedeniyle cihaz hasarı

Elektrikli alanlar veya elektrostatik deşarj; münferit parçaların, entegre devrelerin, yapı gruplarının veya cihazların hasar görmesi sonucu fonksiyon arızalarına neden olabilir.

- Elektronik parçaların, yapı gruplarının veya cihazların ambalajlanması, depolanması ve nakliyesi yalnızca orijinal paketinde veya başka uygun bir malzemeden (örn. iletken köpüklü lastik veya alüminyum folyo) yapılmış paket içinde gerçekleştirilmelidir.
- Parçalara, yapı gruplarına ve cihazlara yalnızca aşağıdaki önlemleri aldıktan sonra dokununuz:
 - EGB kol bandı takınız
 - İletken zeminlerin bulunduğu EGB bölgelerinde EGB ayakkabıları ve EGB topraklama şeritleri kullanınız
- Elektronik parçaları, yapı gruplarını veya cihazları yalnızca iletken altlıklar üzerine yerleştiriniz (örn. EGB altlıklı bir masa, iletken EGB köpük malzeme, EGB ambalaj torbası veya EGB nakliye haznesi).

1.3 Security (güvenlik) notları

Siemens, tesislerin, sistemlerin, makinelerin ve ağların güvenli şekilde çalışmasını destekleyen endüstriyel güvenlik işlevlerine sahip ürünler ve çözümler sunmaktadır.

Tesislerin, sistemlerin, makinelerin ve ağların Siber Tehditlere karşı korunması amacıyla, bütünsel, en son teknoloji ürünü bir endüstriyel güvenlik konseptinin uygulanması ve sürekli olarak sürdürülmesi gerekmektedir. Siemens tarafından sunulan ürünler ve çözümler bu gibi bir kavramın sadece bir unsurunu oluşturmaktadır.

Tesislerine, sistemlerine, makinelerine ve ağlarına yetkisiz erişimi önlemek müşterilerin sorumluluğu altındadır. Söz konusu sistemler, makineler ve bileşenler kurumsal ağa veya internete sadece bu gibi bir bağlantının gerekli olması durumunda ve gerekli olduğu ölçüde ve yalnızca uygun güvenlik önlemlerinin (örneğin güvenlik duvarları ve/veya ağ segmentasyonu) alınmasından sonra bağlanmalıdır.

Uygulanabilecek endüstriyel güvenlik önlemlerine ilişkin daha fazla bilgi için lütfen <https://www.siemens.com/industrialsecurity> (<https://www.siemens.com/industrialsecurity>) adresini ziyaret edin.

Siemens'in ürünleri ve çözümleri, bu ürünlerin ve çözümlerin daha da güvenli hale getirilmesi amacıyla sürekli olarak geliştirilmektedir. Siemens, ürün güncellemelerinin mümkün olan en kısa sürede uygulanmasını ve en son ürün sürümlerinin kullanılmasını şiddetle tavsiye etmektedir. Artık desteklenmeyen ürün sürümlerinin kullanılması ve en yeni güncellemelerin uygulanmaması siber tehditlere maruz kalma riskinizi artırabilmektedir.

Ürün güncellemeleri hakkında bilgi sahibi olmak için lütfen <https://www.siemens.com/industrialsecurity> (<https://new.siemens.com/global/en/products/services/>)

<cert.html#Subscriptions>) adresinde bulunan Siemens Endüstriyel Güvenlik RSS Yayınına abone olun.

Daha fazla bilgiyi internette bulabilirsiniz:

Proje (konfigürasyon) kitabı Industrial Security (<https://support.industry.siemens.com/cs/ww/en/view/108862708>)



İKAZ

Yazılım manipülasyonu nedeniyle güvensiz işletim durumları

Yazılım manipülasyonları, örneğin virüsler, truva atları veya solucanlar, sisteminizde güvensiz işletme durumlarına neden olabilir ve bu durum maddi hasarlarla, ciddi yaralanmalarla ve ölümlerle sonuçlanabilir.

- Yazılımınızı güncel tutun.
- Otomasyon ve tahrik bileşenlerini en güncel teknolojiye uygun bir makine veya sistem bütüncül Industrial Security konsepti dahilinde entegre edin.
- Tüm kullanılan ürünlerde bütüncül Industrial Security konseptinizi dikkate alın.
- Çıkarılabilir kayıt ortamlarındaki dosyalar, zararlı yazılımlara karşı uygun koruyucu önlemler ile korunmalıdır, örneğin virüs programı.
- İşletim sonlandırılırken güvenlikle ilgili tüm ayarlar kontrol edilmelidir.

1.4 Tahrik sistemlerindeki (Power Drive Systems) diğer riskler

Makine üreticisi veya sistem yükleyicisi yerel talimatlar uyarınca (örn. AB Makine Yönetmeliği), makine veya sisteme yönelik yürütülecek risk değerlendirmesi sırasında tahrik sistemindeki kumanda ve tahrik bileşenlerine ilişkin aşağıdaki diğer riskleri de dikkate almalıdır:

1. İşletime alma, işletim, bakım ve onarım sırasında çalışan makine veya sistem parçalarının aşağıdaki nedenlerle istem dışı hareket etmesi:
 - Sensör sistemindeki, kumandadaki, tahrik sistemindeki ve bağlantı tekniğindeki bir donanım ve / veya yazılım hatası
 - Kumanda ve tahrik ilişkili tepki süreleri
 - Spesifikasyon haricindeki çalışma ve / veya ortam koşulları
 - Yoğuşma / iletken kirlenme
 - Parametrelendirme, programlama, kablo sistemi ve montaj hataları
 - Elektronik parçaların hemen yakınında telsiz cihazlarının / mobil telefonların kullanılması
 - Dış etkiler / hasarlar
 - Röntgen ışınları, iyonlaştırıcı ve kozmik ışıma
2. Hata durumunda parçaların içinde ve dışında alev alma da dahil olmak üzere alışık olunmayan yükseklikte sıcaklıklar oluşabileceği gibi ışık, ses, partikül, gaz vb. emisyonlar da ortaya çıkabilir, örn.:
 - Yapı elemanı arızaları
 - Yazılım hatası
 - Spesifikasyon haricindeki çalışma ve / veya ortam koşulları
 - Dış etkiler / hasarlar
3. Aşağıdakiler nedeniyle oluşabilecek tehlikeli temas gerilimleri:
 - Yapı elemanı arızaları
 - Elektrostatik şarjlardan etkilenme
 - Hareketli motorlarda gerilim indüksiyonu
 - Spesifikasyon haricindeki çalışma ve / veya ortam koşulları
 - Yoğuşma / iletken kirlenme
 - Dış etkiler / hasarlar
4. Normal çalışma koşulları altındaki elektrikli, manyetik ve elektromanyetik alanlar (örn. kalp pili, implant veya metalik cisim taşıyıcıları için), yeterli mesafe korunmadığında tehlikeli olabilir
5. Sistemin usulüne uygun olmayan şekilde kullanılması ve / veya bileşenlerin usulüne uygun olmayan şekilde imha edilmesi sonucu ortaya çıkan, çevreye zararlı maddeler ve emisyon salınımı
6. Ağa bağlı iletişim sistemlerinin etkisi, örneğin dalgacıkla kontrol vericileri veya ağ üzerinden veri iletişimi

Tahrik sistemi bileşenlerinden kaynaklanan diğer risklerle ilgili ayrıntılı bilgileri teknik kullanıcı dokümantasyonunun ilgili bölümlerinde bulabilirsiniz.

2.1 Amacına uygun kullanım

 İKAZ
Amacına uygun olmayan kullanımdan kaynaklanan ölüm ve maddi hasar tehlikesi vardır Motorları veya onların bileşenlerini amacına uygun bir şekilde kullanmazsanız, ölüm, ağır yaralanma ve/veya maddi hasar tehlikesi vardır. • Motorları prensip olarak sadece endüstriyel veya ticari tesisler için kullanın. • Motorları özel durumda endüstriyel veya ticari tesislerde kullanmazsanız, (örneğin dokunmaya karşı koruma açısından) daha yüksek koşullara uyulmasını sağlamamış olursunuz. • Motorlar özellikle bunun için öngörülmemişse, motorları patlama tehlikesi bulunan ortamlarda (Ex-alanları) kullanmayın. Gerekirse ayrı olarak eklenen ek uyarılara da uyun. • Motorları ve bileşenlerini sadece Siemens tarafından belirtilen kullanım olayları için kullanın. • Motorları kirlenmeden ve tahrik edici maddelere temastan koruyun. • Kullanım yerindeki koşulların, tüm güç levhası bilgilerine ve bu belgelerde verilen koşullarla ilgili bilgilere uygun olduğundan emin olun. Gerekirse ruhsatlandırmalarla ilgili sapmaları veya ülkeye özel kuralları dikkate alın. • Amacına uygun kullanım hakkında sorunuz varsa, yetkili Siemens şubenize başvurun. • Teknik ayrıntılarında burada tarif edilen motorlardan sapma gösteren özel modeller ve yapı türleri kullanmak istiyorsanız, yetkili Siemens şubenizle görüşün.

 İKAZ
Aktif implantların taşıyıcıları için manyetik ve elektrikli alanlardan kaynaklanan ölüm tehlikesi vardır Elektrik motorları, motorların çok yakınında duran aktif implantlara, örneğin kalp piline sahip kişileri tehlikeye sokar. • Etkilenen kişi olarak, motorlarla minimum 500 mm mesafesini koruyun (2013/35/AB yönetmeliğine göre, statik manyetik alanlar için 0,5 mT tetikleme eşiği).

Motorlar, normalde üretim atölyelerinde olduğu gibi, üzeri kapalı mekanlarda çalıştırılmak için tasarlanmıştır (bakın bölüm Ortam koşulları (Sayfa 22)).

1PH808 ve 1PH810 motor serisinin trifaze akım asenkron motorları, alet ve üretim makineleri için endüstri tahrikler olarak kullanılır. Bunlar, tahrik tekniğinde geniş uygulama alanları için tasarlanmıştır. Trifaze akım motorları devir sayısı ayarlı olarak bir frekans değiştiricisi üzerinden beslenir.

Bu motorlar kendilerini yüksek verim yoğunluğu, yüksek dirençlilik, uzun ömür ve yüksek güvenilirlik hususunda göstermiştir.

2.2 Teknik özellikler ve ortam koşulları

2.2.1 Direktifler ve standartlar

Uyulan standartlar

Bundan böyle "SIMOTICS motor serisi" olarak anılacak olan SIMOTICS S, SIMOTICS M, SIMOTICS L, SIMOTICS T, SIMOTICS A ürün serisi motorları; aşağıda listelenen direktiflerin ve standartların gereksinimlerini karşılar:

- EN 60034-1 - Dönen elektrikli makineler – Boyutlandırma ve çalışma karakteristiği
- EN 60204-1 - Makinelerin güvenliği - Makinelerin elektrikli donanımı - Genel gereksinimler

Uygulanabilir olduğunda, SIMOTICS motor serisi, EN 60034'ün aşağıdaki bölümlerine karşılık gelir:

Karakteristik	Standart
Koruma tarzı	EN 60034-5
Soğutma ¹⁾	EN 60034-6
Format	EN 60034-7
Bağlantı açıklamaları	EN 60034-8
Gürültü emisyonu ¹⁾	EN 60034-9
Sıcaklık denetlemesi	EN 60034-11
Titreşim büyüklüğü seviyeleri ¹⁾	EN 60034-14

¹⁾ Standart parça örn. yerleşik motorlar için geçerli değildir.

İlişkili direktifler

SIMOTICS motor serisi için aşağıdaki direktifler ilişkilidir.

Avrupa alçak gerilim talimatnamesi

SIMOTICS motor serisi, 2014/35/EU alçak gerilim talimatnamesi gereksinimlerini karşılamaktadır.

Avrupa makine direktifi

SIMOTICS motor serisi makine direktiflerinin geçerlilik alanına girmez.

Fakat tipik bir makine uygulamasında bu direktiflerin sağlık ve güvenlik açısından önemli olan yönetmeliklerine tamamen uygulanmasına bu ürünlerde dikkat edilmiştir.



Avrupa EMU direktifi

SIMOTICS motor serisi EMU direktiflerinin geçerlilik alanına girmez. Bu ürünler ilgili direktife yönelik cihazlar kapsamına girmez. Bir konvertöre monte edildiğinde ve çalıştırıldığında, motor, güç tahrik sistemi ile birlikte ilgili EMU direktifinin gerekliliklerine uygun olmalıdır.

Avrupa RoHS direktifi

SIMOTICS motor serisi, belirli tehlikeli maddelerin kullanımının kısıtlanmasına ilişkin 2011/65/EU direktifine uygundur.

Avrupa elektrikli ve elektronik eski cihaz direktifi

SIMOTICS motor serisi, eski elektrikli ve elektronik cihazların iadesi ve geri dönüştürülmesine ilişkin 2012/19/EU yönergesi ile uyumludur.

Elektrik motorları için çevre dostu tasarım gereksinimlerine ilişkin Avrupa Yönergesi 2005/32/EG

SIMOTICS motor serisi, bu direktifin uygulanması için (EG) No. 640/2009 Yönetmeliği kapsamına girmez.

Elektrik motorları ve devir kontrolleri için eko tasarım gerekliliklerini belirleyen 2009/125/EG sayılı Avrupa Yönergesi

SIMOTICS motor serisi, bu direktifin uygulanması için (EU) 2019/1781 Yönetmeliği kapsamına girmez.

Eurasian Conformity (Avrasya Uygunluğu)

SIMOTICS motor serisi Rusya/Belarus/Kazakistan (EAC) gümrük birliği gereksinimlerini karşılamaktadır.

**China Compulsory Certification**

SIMOTICS motor serisi China Compulsory Certification (CCC sertifikası) uygulama alanına girmez.



CCC negatif sertifikası:

CCC ürün sertifikası (<https://support.industry.siemens.com/cs/ww/en/view/93013317>)

Underwriters Laboratories

SIMOTICS motor serisi, motor uygulamalarına yönelik bileşenler olarak UL ve cUL gereksinimlerini prensipte karşılamaktadır ve uygun şekilde listelenmiştir.



Özel olarak geliştirilmiş motorlar ve ilgili fonksiyonlar istisna niteliğindedir. Teklifin içeriğine ve güç etiketinde (tip etiketi) UL veya cUL işaretinin bulunmasına dikkat ettiğinizden emin olun!

Kalite sistemleri

Siemens AG, ISO 9001 ve ISO 14001 standartlarına uygun bir kalite yönetim sistemi kullanmaktadır.

SIMOTICS motor serisinin sertifikaları aşağıdaki bağlantı kullanılarak internetten indirilebilir:

SIMOTICS motorlarının sertifikaları (<https://support.industry.siemens.com/cs/ww/en/ps/13347/cert>)

Çin RoHS

Motor serisi SIMOTICS, Çin RoHS'ye uygundur.

Daha fazla bilgi için bakınız:

Çin RoHS (<https://support.industry.siemens.com/cs/ww/en/view/109738670>)

Çin Enerji Etiketi (CEL)

Sürekli mıknatıslı 1PH8 senkron motorları, GB30253-2013 sayılı ulusal Çin standardının koşullarına tabidir: Çin Enerji Etiketi söz konusu motorlara takılmıştır.



Resim 2-1 "Çin Enerji Etiketi" örnekleri

CEL'de aşağıdaki motor verileri belirtilmiştir:

- Motor tipi
- % olarak etki derecesi
- kW olarak nominal güç
- Nominal devir sayısı, d/dak

2.2.2 Teknik Özellikler

Motorların en önemli teknik özellikleri, güç etiketinde (tip levhası) belirtilmiştir: Motorların teknik özelliklerine ayrıntılı genel bakışları "SINAMICS S120 için SIMOTICS M-1PH8 ana motorları" projelendirme elkitabında veya D 21.4 ve NC 61 kataloglarında bulabilirsiniz.

2.2.3 Ortam koşulları

Aşağıdaki sıcaklık aralıkları, harici havalandırılmalı motorlar için geçerlidir.

- İşletmede izin verilen sıcaklık aralığı: T = -15 °C ila +40 °C
- Depolamada izin verilen sıcaklık aralığı: T = -20 °C ila +70 °C

Sapma gösteren koşullarda (ortam sıcaklığı > 40 °C veya kurulum yüksekliği deniz seviyesinin 1000 m üstünde olduğunda), izin verilen torklar/güçler aşağıdaki tablodan belirlenmelidir. Ortam sıcaklığı ve kurma yüksekliği 5 °C veya 500 m olarak yukarıya yuvarlanır.

Tablo 2-1 Gücü kurulum yüksekliğine ve ortam sıcaklığına bağlı olarak uygun hale getirme

Deniz seviyesi- nin üstündeki kurulum yük- sekliği [m]	°C olarak ortam sıcaklığı				
	< 30	30 - 40	45	50	55
1000	1,07	1,00	0,96	0,92	0,87
1500	1,04	0,97	0,93	0,89	0,84
2000	1,00	0,94	0,90	0,86	0,82
2500	0,96	0,90	0,86	0,83	0,78
3000	0,92	0,86	0,82	0,79	0,75
3500	0,88	0,82	0,79	0,75	0,71
4000	0,82	0,77	0,74	0,71	0,67

- Torku veya konvertördeki motorun gücünü uygun hale getirin. Konvertörün işletme kılavuzuna uyun.

Not

Uygulanan olmayan kurulum türü

Motorlar, işletme için uygun değildir

- tuzlu veya tahriş edici atmosferde
- Açık havada

2.2.4 Koruma tarzı

Dıştan havalandırılmalı motorlar (1PH808 veya 1PH810), IP55 koruma türünde belirtilmiştir.

Su soğutmalı motorlar (1PH808 veya 1PH810), IP65 koruma türünde belirtilmiştir.

2.2.5 Gürültü emisyonu

 İKAZ
İşitme bozuklukları
Motor, tesise veya pals frekansına bağlı olarak 70 dB (A) ses basınç düzeyini aştığında, işitme kaybına neden olabilir.
Ses basınç düzeyini ses kısma ve/veya ses yalıtım önlemleriyle düşürün.

2.2 Teknik özellikler ve ortam koşulları

1PH808 ve 1PH810 serisi motorlar, 0 ile 5000 1/dak arası devir sayısı aralığında çalışma sırasında DIN EN ISO 1680 uyarınca aşağıdaki ölçüm alanının ses basınç düzeyine L_{pA} ulaşabilir:

Tablo 2-2 Ölçme yüzeyi ses basınç seviyesi

Soğutma türü	Ölçme yüzeyinin ses basınç düzeyi L_{pA} (1 m), nominal yükte ve nominal darbe frekansında 4 kHz
harici havalandırılmalı ¹⁾	70 dB(A) + 3 dB tolerans
su soğutmalı	68 dB(A) + 3 dB tolerans

1) Harici fan işletimi 50 Hz

Motorlara geniş bir kurulum ve işletim koşulları aralığı için izin verilmiştir. Örn. sabit veya titreşime karşı izole edilmiş temel tasarımı gibi koşullar, gürültü emisyonunu kısmen aşırı güçlü etkiler.

2.3 Güç levhası bilgileri (tip levhası)

Güç etiketi (tip etiketi), teslim edilen motor için geçerli olan teknik verileri içerir.

SIEMENS									
SIMOTICS 3 ~		1P	MLFB	L010	S	FID			
OPTIONS				L315	L026	IE-CLASS L035			
L029	L030	IP	L040	THERMAL CLASS		L042	L036		
U_N /V L037		I_N /A L038	P_N /kW L039	U_{IN}/V $\cos \varphi$ L049	f_N /Hz L046	n_N /(r/min) L047	L048	L114	
L050	L051	L060	L070	L080	L090	L100	L110	L115	
L120	L121	L130	L140	L150	L160	L170	L180	L185	
L190	L191	L200	L210	L220	L230	L240	L250	L255	
L257	L258	L260	L261	L263	L265	L266	L267	L269	
I_{max} /A L270		I_{0Y} /A L282	M_{max} /Nm L275		n_{max} /(r/min) L280				
TEMP. SENSOR 1				L285	ENCODER/ TACHO/ RESOL/ TEMP.SENSOR2 L290				
COOLING MEDIUM L295		FLOW RATES L296		SYSTEMS PRESSURE L297		CT MAX L298			
CUSTOMER INFO				L325	BRAKE L320				
L334	L335	kg	L336	L337	L338	SPACE HEATER L330			
Siemens AG, DE-97616 Bad Neustadt						Indication of origin L345			

BARCODE
2D


 EN 60034

 UL L025



Resim 2-2 1PH808 ile 1PH816 arasındaki güç levhasının prensip yapısı

Tablo 2-3 Güç levhası üzerindeki elemanlar

No.	Açıklama	No.	Açıklama
L010	Sipariş numarası (MLFB)	L190	Nominal gerilim U_N (3)
L025	UL işareti	L191	Bağlantı tekniği (3)
L029	Yapı şekli	L200	Nominal akım I_N (3)
L030	Yapı şekli	L210	Nominal güç P_N (3)
L035	Kalite derecesi / IE sınıfı (sadece artıklık motorları)	L220	$\cos \varphi$ (3)
L037	Ölçüm gerilimi U_N	L230	Nominal frekans f_N (3)
L038	Beyan akımı I_N	L240	Nominal devir sayısı n_N (3)
L039	Nominal güç P_N	L250	İşletim türü (3)

No.	Açıklama	No.	Açıklama
L040	Koruma tarzı	L255	Motor kodu (3)
L042	Termik sınıf	L257	Nominal gerilim U_N (4)
L045	Dengeleme işareti	L258	Bağlantı tekniği (4)
L046	Nominal frekans f_N	L260	Nominal akım I_N (4)
L047	Nominal devir sayısı n_N	L261	Nominal güç P_N (4)
L048	İşletim türü	L263	$\cos \varphi$ (4)
L049	Senkron motorlarda: Nominal devir sayısı için oluşturulan gerilim U_{IN}	L265	Nominal frekans f_N (4)
	Asenkron motorlarda: $\cos \varphi$	L266	Nominal devir sayısı n_N (4)
	Artıklık motorlarında: $\cos \varphi$	L267	İşletim türü (4)
L050	Nominal gerilim U_N (1)	L269	Motor kodu (4)
L051	Bağlantı tekniği (1)	L270	Maksimum akım I_{maks}
L060	Nominal akım I_N (1)	L275	Maksimum tork M_{maks}
L070	Nominal güç P_N (1)	L280	Azami devir sayısı n_{maks}
L080	$\cos \varphi$ (1)	L282	Motor durma akımı
L090	Nominal frekans f_N (1)	L285	Sıcaklık sensörü
L100	Nominal devir sayısı n_N (1)	L290	Verici/tako/çözücü/sıcaklık sensörü
L110	İşletim türü (1)	L295	Soğutucu madde
L114	Motor kodu	L296	Akış l/dak (m^3/sn)
L115	Motor kodu (1)	L297	Sistem basıncı
L120	Nominal gerilim U_N (2)	L298	Azami soğutma maddesi sıcaklığı
L121	Bağlantı tekniği (2)	L315	Seçenekler: Z seçenekleri
L130	Nominal akım I_N (2)	L320	Seçenekler II: Fren
L140	Nominal güç P_N (2)	L325	Seçmeli müşteri bilgisi
L150	$\cos \varphi$ (2)	L330	Hareketsiz durum kalorifer
L160	Nominal frekans f_N (2)	L334	Ağırlık
L170	Nominal devir sayısı n_N (2)	L335	Ağırlık
L180	İşletim türü (2)	L345	Menşe uyarısı
L185	Motor kodu (2)	L350	WEEE işareti

2.4 Montaj

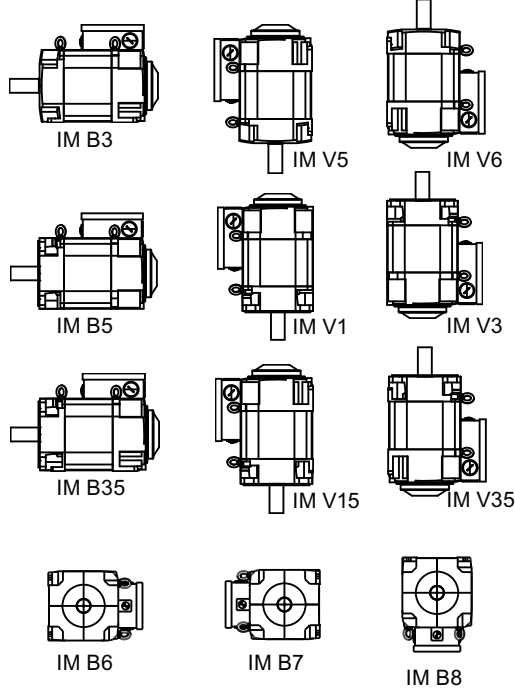
2.4.1 Yapılar

Motor, aşağıdaki yapı şekillerinde olabilir:

Tablo 2-4 Yapılar

Motor	Yapı şekli
1PH808	IM B3 (IM V5, IM V6, IM B6, IM B7, IM B8)
	IM B5 (IM V1, IM V3)

Motor	Yapı şekli
1PH810	IM B3 (IM V5, IM V6, IM B6, IM B7, IM B8)
	IM B5 (IM V1, IM V3)
	IM B35 (IM V15, IM V35)



Resim 2-3 Yapılar

Motorun yanında, taşıma için yapı şekline göre vidalayabileceğiniz, taşımak için iki kaldırma halkası da birlikte gelir.

2.4.2 Soğutma

Harici havalandırma

Soğutma için, motordan bağımsız bir şekilde tahrik edilen bir fanla (harici fan), ayrı bir havalandırma yapı grubu kullanılır.



DİKKAT

Harici fan yetersiz olduğunda aşırı ısınma tehlikesi vardır

Harici fan arızalandığı veya motor kısa süreliğine harici fan olmadan kullanıldığında, motor aşırı ısınır. Aşırı ısınma, arızalara neden olabilir ve cihazların/sistemlerin kullanım ömrünü kısaltabilir.

- Motoru her zaman bir harici fanla birlikte çalıştırın.

**İKAZ**

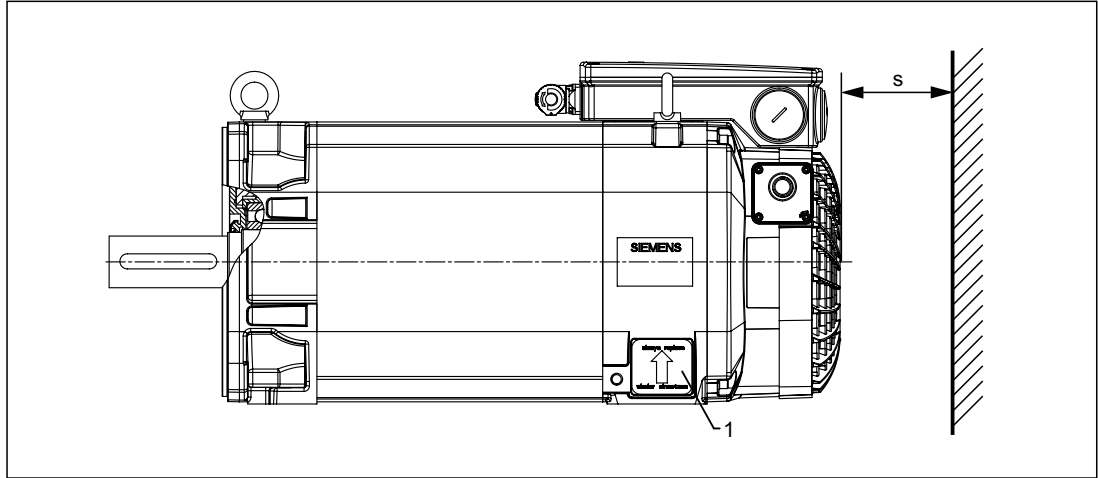
Yetersiz havalandırma/soğutma boşluklarında yangın çıkmasından kaynaklanan ölüm tehlikesi vardır

Yetersiz havalandırma/soğutma boş alanları aşırı ısınmaya ve yangına neden olabilir. Aşırı ısınma, arızalara neden olabilir ve cihazların/sistemlerin kullanım ömrünü kısaltabilir.

- Söz konusu motor için havalandırma/soğutma boş alanı olarak, belirtilen minimum mesafeye uyulmasını sağlayın.

Motorların, soğutma havası engellenmeden gelip gidebilecek ve hava giriş ve çıkış deliklerinin komşu parçalarla arasındaki minimum mesafeye (s) uyulacak şekilde kurulması gerekir (bakın resim "Minimum mesafe"). Uygun önlemlerle, ısıtılan hava çıkışının tekrar emilmemesi sağlanmalıdır.

Motoru sıkıca vidalamak için sökülen kapakların (kon. 1, resim "Minimum mesafe") devreye sokmadan önce tekrar takılması gerekir. Okun yukarıya dönük olması gerekir.



sn 1PH808 ve 1PH810 için minimum 30 mm mesafe gerekir

1 B tarafındaki ayak bağlantısı örtüsü

Resim 2-4 Minimum mesafe (sn)

Su soğutması

Motorun ancak geri soğutma cihazıyla kapalı soğutma suyu devridaiminde çalıştırılmasına izin verilir. Motorun soğutma devridaimine bağlantısı, motorun arkasındaki iki iç dişli üzerinden gerçekleştirilir. Giriş ve çıkışın bağlantısı istediğiniz şekilde seçilebilir.

Tablo 2-5 Su soğutmasının teknik verileri

Soğutma suyu bağlantısı	1PH808 için G1/8" 1PH810 için G1/4"
Soğutma suyu akımı	1PH808 için 6 l/dak 1PH810 için 8 l/dak
Girişteki maks. basınç	maks. 6 bar

Giriş ile çıkış arasındaki basınç düşüşü	1PH808 için minimum soğuk su akımında < 0,6 bar 1PH810 için minimum soğuk su akımında < 0,4 bar
Maksimum soğutma suyu giriş sıcaklığı, güç azaltmasız	≤ 30 °C, daha büyük değerler, gücün azalmasını sağlar

Not**Soğutma suyu giriş sıcaklığı**

Soğutma suyunun giriş sıcaklığını, motorun yüzeyinde yoğuşma oluşmayacak şekilde seçin.

Soğutma suyu sıcaklıkları ortam sıcaklığının altında kaldığında daha fazla yoğuşma görülür. Soğutma suyunun giriş sıcaklığıyla ortam sıcaklığı arasındaki fark, bağıl nem oranına bağlıdır. Böylece örneğin 40 °C ortam sıcaklığında %50 nem, 10 K sıcaklık farkına tekabül eder:

$$T_{\text{soğutma}} > T_{\text{çevre}} - \text{sıcaklık farkı}$$

Bunun dışında, motor uzun süre devre dışı bırakıldığında soğutma suyu girişi de kapanmalıdır.

Soğutucu olarak ancak pas koruması ve yosun oluşumunu önlemek için yeterli miktarda uygun katkı maddeleri ilave edilmesi gereken su kullanılmasına izin verilir. Diğer soğutucular (örneğin soğutucu yağlama maddeleri, yağ oranı %10'un üzerinde olan su-yag karışımları), gücün düşmesine neden olabilir.

Donma tehlikesi olduğunda, işletme, depolama ve taşıma için donmaya karşı koruma önlemlerinin alınması gerekir (antifriz, soğutma devridaimini boşaltma ve hava püskürtme vs.). Antifrizin üretici talimatlarına göre kullanım ve dozajlaması (maks. %25). Farklı antifrizleri karıştırmaktan kaçınılmalıdır.

Motorun ilerleme hattının kirlere karşı bir filtreyle (100 µm) korunması gerekir. Motorun ilerleme hattının, filtrenin arkasındaki bir yüksek basınç valfiyle korunması gerekir.

Hat ve armatürler için paslanmaz çelik veya plastik kullanılabilir. Çok yakındaki farklı malzemeler kullanıldığında ise, elektro-kimyasal gerilim serisine uyulması ve bu nedenle çinkonun kullanılmaması gerekir.

Akıllı kısıtlamak için bir regülatör gerekirse, kısmının motordan sonra gerçekleştirilmesi mantıklı olur. Doğrudan girişinin önündeki bir kısma, kavitasyon etkilerinden dolayı motorda hasara neden olabileceği için izin verilmez.

Soğutma suyu için belirtilen değerler (aşağıdaki tabloya bakın), kapalı soğutma devridaimlerinin koşullarına uygundur. Soğutma suyunda öngörülen tüm konsantrasyonlar aynı anda ortaya çıkmaz.

Tablo 2-6 Soğutma suyu koşulları

Özellik	Paslanmaz çelik borular + gri döküm veya çelik kılıflı motorlar için soğutucu olarak suyun kalitesi
pH değeri	6 ... 9
Toplam sertlik	< 170 ppm
Elektriksel iletkenlik	< 500 µS/cm
Klorür iyonları	< 40 ppm, gerekirse deiyonize su karıştırılarak sağlanabilir
Sülfat iyonları	< 50 ppm
Nitrat iyonları	< 50 ppm

Özellik	Paslanmaz çelik borular + gri döküm veya çelik kılıflı motorlar için soğutucu olarak suyun kalitesi
Çözülmüş katı maddeler	< 340 ppm
Maksimum parçacık büyüklüğü	< 100 µm
İşletme basıncı	< maks. 6 bar
Basınç düşüşü, V(N)	< 1 bar
Giriş sıcaklığı	< 30 °C
Antifriz / Korozyon koruması	20 ... 30 %
İnhibitör NALCO 00GE056	%0,2 ... 0,25

Not**Motoru depolama veya taşıma**

Motoru depolama, uzun süreli durma ve taşıma sırasında soğutma devridaimi boşaltılmalıdır.

2.4.3 Durdurma freni (seçenek)

2.4.3.1 Özellikler

SINAMICS S'de durdurma freniyle çalışma

SINAMICS S tahrik sisteminin farklı fren kumandası türleri vardır. Münferit işlevlerin ayrıntılı bir açıklamasını ve söz konusu parametrelendirme uyarılarını aşağıdaki elkitablarında bulabilirsiniz:

- SINAMICS S120 işlev elkitabı (6SL3097-4AB00-0□P□) böl. 6.14
- SINAMICS S120/S150 liste elkitabı (6SL3097-4AP00-0□P□) böl. 2.12

Fren çıkışlarının dayanıklılığı/münferit SINAMICS güç ünitesinin adaptörü hakkındaki bilgiler için söz konusu cihaz elkitabına bakın. Gerekirse frenin ek şalter elemanı ile çalıştırılması gerekir.

SINAMICS'teki fren verilerini doğru parametrelendirmeye dikkat edilmelidir. Bu özellikle şunun ayarlama değerleri için geçerlidir:

- Motorun maksimum devir sayısı ("Durdurma freni" seçeneğinde azaltılmış değer)
- Durdurma frenini açma ve kapatma süreleri
- Durdurma freninin eylemsizlik momenti

Söz konusu ayarlama değerleri, frene özek olarak "Durdurma freninin teknik verileri" tablosunda belirtilmiştir.

Durdurma freninin çalışma şekli

Aks yüksekliği 80 ve 100 olan 1PH8 motorlarına, motorun A tarafına bir fren takılabilir.

Bu frenler, kuru çalışma için elektromanyetik cihazlardır. Yay basıncıyla oluşturulan frenleme etkisini kaldırmak için bir elektromanyetik alan kullanılır. Frenler, durağan akım prensibine göre çalışır, yani yaylı basınç freni akımsız durumda frenler ve tahriki sıkıca tutar. Gerilim uygulandığında fren havalandırılır ve tahrik dönebilir.

Gerilim kesintisi veya acil durdurma durumunda tahrik, geçerli devir sayısından durmaya kadar frenlenir.

Frenlerin bağlantısı (müşteri tarafında kullanıma sunulması gerekir)

- Alternatif akım 230 V AC, 50 ... 60 Hz
- Doğru akım 24 V DC

Ortam sıcaklığı

Frenleme modülü, -5 °C ile +40 °C arasındaki bir ortam sıcaklığı için tasarlanmıştır. -5 °C altındaki sıcaklıklarda ve akış olmayan uzun durma sürelerinde sürtünme diskinin donması önlenemez. Bu durumda, üretici ile görüşerek özel önlemlerin alınması gerekir.

Not

Motorun maksimum devir sayısını frenle kısıtlama

Frenli bir motorun maksimum devir sayısı, frenin maksimum devir sayısı ile sınırlıdır (referans çizgilerindeki devir sayısı bilgisine $n_{maks, Br}$ bakın).

Not

Seçim ve sipariş verileri

Seçim ve sipariş bilgilerini "SIMOTICS M-1PH8 ana motorları" projelendirme elkitabının "Seçim ve sipariş verileri" bölümünde bulabilirsiniz.

DC 24 V ve AC 230 V model durdurma frenleri UL onaylıdır.

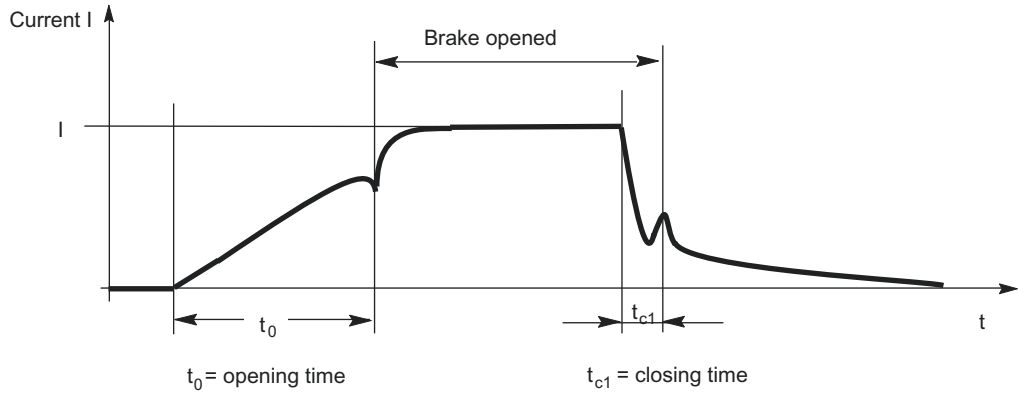
Durdurma frenlerinin teknik verileri

Aks yüksekliği	Motor tipi	Fren tipi	Tutma momenti	Maksimum devir sayısı	Eylemsizlik momenti	Ağırlık	Besleme akımı		İzin verilen tek devreli çalışma	Eylemsizlik momenti, toplam (Acil durdurma)	Devir sayısı (acil durdurma)	Acil durma sayısı ¹⁾	Açma süresi	Kapatma süresi ²⁾
							230 V AC $\pm\%10$	24 V DC $\pm\%10$						
			Nm olarak	n_{max} / rpm	J_{Br} / kgm ²	m_{Br} / kg	A olarak	A olarak	W_E / KJ	J_{tot} / kgm ²	n / rpm	z	t_0 / ms	t_{c1} / ms
80	1PH808□	Boyut 13	29	5000	0,00093	10	0,8	4,1	2,2	0,0174	4800	2000	150	300 (40)
100	1PH810□	Boyut 19	60...150	5000	0,0048	21	1,0	4,7	7	0,063	4500	2000	500	500 (60)

¹⁾ Saat başına maks. 3 çalıştırma.

²⁾ AC 230 V'deki kapanma süresi Parantez içindeki süre, 24 V DC gerilim beslemesindeki kapanma süresine ve 230 V AC gerilim beslemesindeki DC şalterli kapatma süresine işaret eder.

Resim 2-5 (A tarafındaki) acil durdurma işlevli montaj durdurma freninin teknik verileri



Resim 2-6 Durma işletmesinin zaman terimleri

Tablodaki terimlerin açıklaması

Tutma momenti, Nm: Aks yüksekliği 100 olan motorlarda tutma momenti, bir ayarlama halkasıyla belirtilen değer alanında kademesiz olarak ayarlanabilir. Dinamik frenleme momenti, ayarlanan tutma momentinin yaklaşık yüzde 70'idir.

Maksimum devir sayısı n_{maks} / 1/dak: İzin verilen maksimum devir sayısı

İzin ver. tekli şalter çalışması W_E / KJ: Bir acil durdurmada izin verilen şalter işi,
 $W_E = J_{toplaml} \cdot n^2 / 182,4 \times 10^{-3}$ (J, kgm², n, 1/dak)

Kullanım ömrü boyunca şalter işi W_{maks} / MJ: Frenin, sürtünme diskinin değiştirilmesi gerekmeden önce olabilecek maksimum şalter işi (acil durdurmada), $W_{maks} = W_E \times z$.

Acil durma sayısı z: Verilen acil durma sayısı, belirtilen koşullara dayalıdır. Diğer koşullarda dönüştürülebilir: Acil durma sayısı $z = W_{maks}/W_E$

Bobin akımı, A: Freni havalandırma akımı

Açılma süresi t_0 / ms: Fren açılana kadarki ayırma süresi (belirtilen değerler, maksimum frenleme momenti ve nominal gerilim için geçerlidir)

Kapanma süresi t_{c1} / ms: "Durma işletmesinin zaman terimleri" grafiğine göre, fren kapanana kadarki bağlantı süresi (belirtilen değerler, maksimum frenleme momenti ve nominal gerilim için geçerlidir).

Amacına uygun kullanım

"Yay basıncı tek balatalı frenleme modülleri", asenkron veya senkron motorlara takmak içindir ve ticari veya endüstriyel tesislerdeki kullanım için öngörülmüştür. Patlama/gök gürültülü hava tehlikesi altında bulunan alanlarda kullanılması yasaktır. Dışa takılan yay basıncı tek balatalı freni (elektromanyetik açık sistem), durdurma freni olarak tasarlanmıştır. Arada bir yapılan acil durmalar mümkündür.



İKAZ

Durdurma freni yanlış kullanıldığında ölüm tehlikesi vardır

Durdurma frenini yanlış, örneğin güvenlik freni olarak kullanırsanız, yaralanma ve maddi hasar da içeren ağır kazalara neden olabilir.

- Uygulama durumuna göre söz konusu kaza önleme kurallarına uyun.

DİKKAT

Frenleme etkisinin ters çevrilemez şekilde azaltılması

İzin verilen saatteki şalter sayısına ve/veya saatte izin verilen maksimum şalter işine uymazsanız, frenleme etkisi geri döndürülemeyecek şekilde azalabilir. Ayrıca durdurma freninin çalışması kısıtlanabilir.

- Özellikle makine ve tesisleri ayarlarken (adımlama modu) "Durdurma frenlerinin teknik verileri" tablosuna uyun.
- Torku kaldırmak için durdurma frenini bir el havalandırmasıyla donatabilirsiniz.

DİKKAT**Durdurma frenini yanlışlıkla çalıştırma**

Durdurma frenini yanlışlıkla kullanırsanız, maddi hasara neden olabilirsiniz.

- Durdurma frenini yanlışlıkla açılmaya ve kötüye kullanmaya karşı emniyete alın. Mekanik el havalandırması, çalışmaz durumda muhakkak orta konumda bulunmalıdır ("Yay basıncı tek balatalı frenleme modülü" grafiğine bakın). Tam kapalı bir fren ve yay basıncının tek balatalı frenleme modülünün tam frenleme etkisi ancak o zaman garanti edilir.
- Tesisle ilgili, örneğin kaldırma malzemesi yapısında bir el havalandırmasına izin verilip verilmediği konusundaki özel kurallara uyun.
- Nominal işletim koşulları, DIN VDE 0580 için geçerlidir: 1994-10. Koruma türü, DIN VDE 0470, bölüm 1 için geçerlidir. Sapmalardaki olası özel önlemleri üreticiyle kararlaştırın.

Not**Özel önlemler**

Özel önlemlere referanslar varsa ve/veya üreticiyle görüşülmesi gerekirse, daha tesisi projelendirme sırasında üreticinin fikrini alın.

Ayrıca bakınız

Durdurma freni uyarısı (Sayfa 131)

2.4.3.2 SH 80 ve SH 100 için durdurma frenini takma

Durdurma frenini (seçenek) takma, "Durdurma freni işletme kılavuzu" ekinde tarif edilmiştir.

Not**Radyal ve eksenel kuvvetler**

İzin verilen radyal ve eksenel kuvvetler için, "Standart" yatak modelindeki bilgiler geçerlidir. ("Ana motorlar SIMOTICS M-1PH8 projelendirme elkitabına bakın)

Uygulama ön hazırlığı

3.1 Sevk ve ambalaj

Teslimatın eksiksiz olduğunun kontrol edilmesi

Tahrik sistemleri bireysel olarak meydana getirilmiştir. Sevkiyatı teslim aldıktan hemen sonra teslimat kapsamı ile malzemenin yanında bulunan evrakların birbirine uyup uymadığını kontrol ediniz. Eksikler ve hasarlar için sonradan yapılan şikayetlerde Siemens hiçbir sorumluluk üstlenmez.

- Görünen nakliye hasarlarını derhal teslimatçıya bildirip şikayetçi olunuz.
- Görünen hasarları / eksik teslimatları derhal ilgili Siemens temsilciliğine bildiriniz ve şikayetçi olunuz.

Güvenlik uyarıları teslimat kapsamının bir parçasıdır ve iyi bir yerde muhafaza edilmelidir.

Teslimatın yanında ayrı olarak gelen güç levhası (tip levhası), motorun yakınındaki motor verilerini belirtmek için öngörülmüştür.

Ayrı olarak yanında verilen güç levhası,

- bağlantı kutulu motorlarda bağlantı kutusundadır.
- fişli motorlarda güvenlik veri sayfasındadır.

3.2 Nakliye ve depolama

 İKAZ
Kaldırma ve nakliye işlemlerinde ölüm tehlikesi vardır Kaldırma ve taşıma işlemlerinin amacına uygun olmayan modeli, uygun olmayan veya zararlı kaldırma tertibatları ve yük alma maddeleri ölüme, ağır yaralanmalara ve/veya maddi hasara neden olabilir. • Sadece uygun ve sağlam kaldırma tertibatları ve ülkeye özel kurallara uygun yük alma maddeleri kullanın. • Sadece motor ağırlığına uygun kaldırma tertibatları ve yük alma maddeleri kullanın. Motor ağırlığı güç levhasında belirtilmiştir. • Kaldırma tertibatlarına ve yük alma maddelerine ek yük takmayın. • Motoru kaldırmak ve taşımak için uygun halat veya germe tertibatları kullanın.

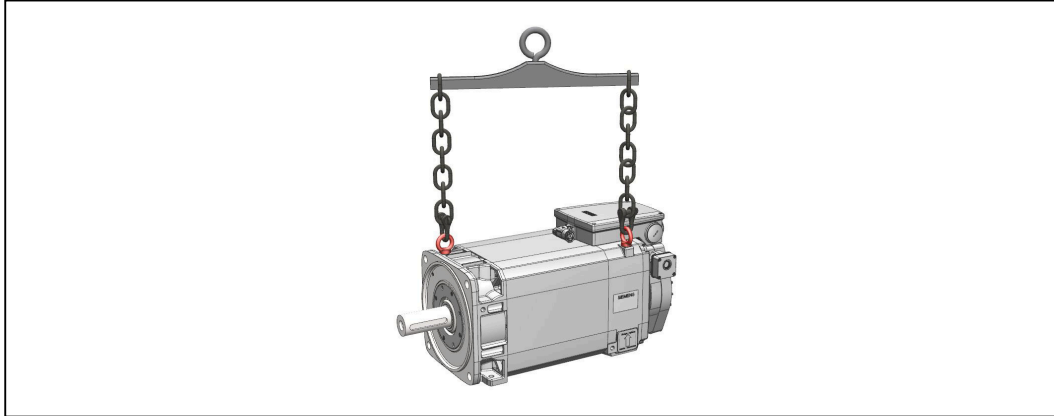
**İKAZ****Motoru yanlış nakliyeden ve/veya kaldırmadan kaynaklanan ölüm tehlikesi**

Motoru yanlış taşıma ve/veya kaldırma ağır yaralanmalara ve/veya maddi hasara neden olabilir. Örneğin motor aşağı düşebilir.

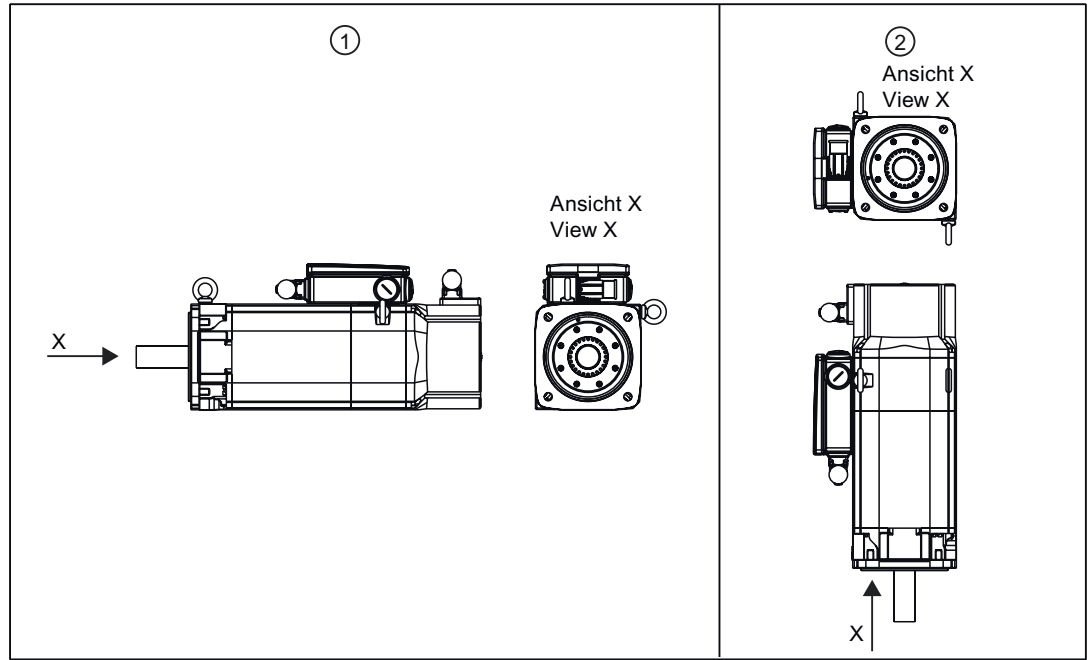
- Motoru ancak yatak levhalarındaki kaldırma halkalarından kaldırın.
- Taşıma sırasında mevcut tüm kaldırma halkalarını kullanın.
- Milin ucuna kaldırma halkaları takmayın.
- Motoru sensör modülünden veya soğutma suyunun boru sisteminden kaldırmayın.
- Motoru (DIN 580'e göre) beraberinde gelen halka vidalarından kaldırır ve/veya taşırsanız, bir travers kullanın. Dikkat etmeniz gerekenler:
 - Halka vidalarını (kaldırma halkaları) tamamen ve elle yakl. 8 Nm vidalayın. Halka vidalarını aşırı sıkmayın.
 - Pres gerdirme altlık pullarını çıkartmayın - deforme olmuş veya hasarlı halkalı cıvataları kullanmayın.
 - Halka düzlemi boyunca yüklere izin verilmez.
 - Milin ucu aşağıya veya milin ucu yukarıya dönük olan montaj konumu için kaldırma halkalarını, aşağıdaki kaldırma halkalarını dizme resimlerindeki gibi uygulayın.

3.2.1**Nakliye**

Bu bölümde, motorları doğru kaldırma ve taşıma hakkında bilgi alırsınız.



Resim 3-1 Motoru traversle kaldırma ve taşıma (örnek)



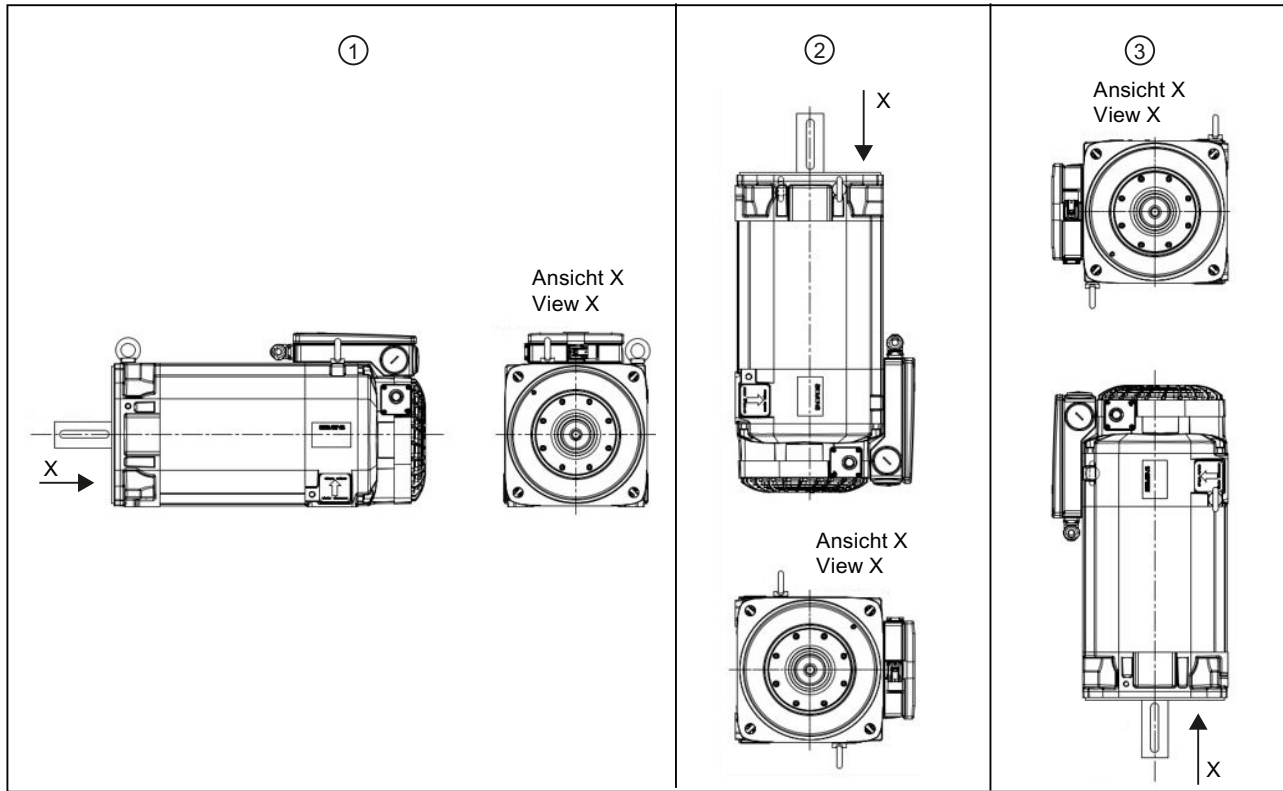
- ① Milin ucu yatay (standart)
- ② Milin ucu aşağıya doğru

Resim 3-2 1PH808 için kaldırma halkalarının düzeni

Not

SMI'li kısa 1PH8081-□□□□□ motorlarında, AS üzerindeki kaldırma halkaları her zaman çarpışmasız olarak monte edilemez.

Bu nedenle bu motorlarda kaldırma halkaları daha fabrikadan, sağdaki şekilde, "1PH808 için kaldırma halkalarının düzeni" resmindeki gibi önceden takılmıştır.



- ① Milin ucu yatay (standart)
- ② Milin ucu yukarıya doğru
- ③ Milin ucu aşağıya doğru

Resim 3-3 1PH810 için kaldırma halkalarının düzeni

Zaten işletmede olan bir motoru taşıma

Prosedür

Motoru zaten çalıştırdıysanız ve şimdi onu taşımak istiyorsanız, aşağıdaki adımları izleyin:

1. Motorun soğumasını sağlayın.
2. Müşteri tarafından yapılan bağlantıları çıkartınız.
3. Gerekirse soğutma suyu sistemini boşaltın ve basınçlı hava püskürterek dikkatli bir şekilde temizleyin.
4. Motoru ancak yatak levhalarındaki kaldırma halkalarından taşıyın ve kaldırın.



3.2.2 Depolama

Not

Rulman yataklarını değiştirme

- Motor uygun koşullar altında (yani kuru, tozsuz ve titreşimsiz bir odada) üç yıldan uzun bir süre depolanmışsa, yatakları değiştirmeniz gerekir.
- Motor uygunsuz koşullar altında depolanmışsa, yatakları daha yakl. 18 ay sonra bile değiştirmeniz gerekir.

DİKKAT

Yataklardaki bekleme (durma) hasarları

Yanlış depolamada, örneğin titreşimler nedeniyle depolama hasarları (örneğin oluklar) tehlikesi söz konusudur.

- Depolamayla ilgili talimatlara uyun.

Motorlar, belirtilen depolama süresinde hiçbir kısıtlama olmaksızın kuru, tozsuz ve titreşimsiz odalarda ($v_{\text{eff}} < 0,2 \text{ mm/sn}$) en fazla iki yıl boyunca depolanabilir.

Kapalı alanlarda depolama

- Fabrikada henüz sürülmemişse, parlak dış parçalara, örneğin mil uçlarına bir koruyucu madde (örneğin Tectyl) sürün.
- Motoru, aşağıdaki koşulları sağlayan bir depo odasında depolayın:
 - Burası kuru, tozsuz ve titreşimsiz bir yer olmalıdır. Bağıl hava nemi % 60'dan az olmalıdır, sıcaklık EN 60034-1'e göre -15 °C altına düşmemelidir.
 - İyi havalandırılmış olmalıdır.
 - Aşırı hava koşullarına karşı koruma sağlamalıdır.
 - Depo odasının havasında tahriş edici gazlar bulunmamalıdır.
- Motoru darbelerden ve nemden koruyun.
- Motoru güzelce örtün.
- Temas korozyonunu engelleyin. Milin ucunu her üç ayda bir manuel olarak tam çevirmeniz tavsiye edilir.

Neme karşı koruma

Kuru bir depolama yeri yoksa, aşağıdaki önlemleri alın:

- Motoru nem emici malzemeye sarın ve sonra hava geçirmeyecek şekilde folyoyla paketleyin.
- Birden fazla torba kurutma maddesini de birlikte yalıtım paketine koyun. Kurutucu maddeleri kontrol ediniz ve gerekirse değiştiriniz.

- Yalıtım paketinin içine, yalıtım paketindeki havadaki nemi görüntüleyen bir nem göstergesi yerleştirin.
- Motoru düzenli olarak denetleyin.

Uzun süreli depolama

Motoru altı aydan daha uzun bir süre depolarsanız, bu durumda her altı ayda bir makinenin kurallara uygun durumunun kontrol etmeniz gerekir.

- Motoru hasarlar için kontrol edin.
- Gerekli bakım çalışmalarını uygulayınız.
- Tüm muhafaza çalışmalarını kağıda dökün, böylece daha sonraki bir çalıştırmadan önce bunlar geriye dönüştürülebilir.
- Depolama koşullarına uyulmadığında, depo alanını iklimlendirin.
- Mil ucunu elle döndürünüz.

Soğutma suyu sisteminin korunması

Paslanmaz çelik-gri döküm-soğutma suyu boru sistemi, teslimat durumunda soğutma suyuyla dolu değildir.

- Motoru kullandıktan sonra depolayacaksanız, soğutma suyu kanallarını boşaltın ve tam boşalmaları için içlerine hava püskürtün.

Mekanik montaj

4.1 Kurulum

DİKKAT
Sıcaklığa duyarlı parçalarda termik hasar
Motorun gövde parçalarında 100 °C'den yüksek sıcaklıklar görülebilir. Örneğin elektrik hatları veya elektronik parçalar gibi, sıcaklığa duyarlı olan parçalar sıcak yüzeylere temas ederse, bunlar hasar görebilir.
Sıcaklığa duyarlı parçaların sıcak yüzeylere dayanmadığından emin olun.

DİKKAT
Yanlış montajdan dolayı motorda hasar
Milin ucuna vurma veya basınç uygulama, motora zarar verebilir.
Motorun kurulum ve montajında, mil uçlarının darbelere ve basınca maruz bırakılmamasına dikkat edin.

Not

Motor gövdesindeki teknik veriler

- Motor mahfazasındaki güç levhasındaki (tip levhası) teknik verilere uyun.

Motoru takma uyarıları

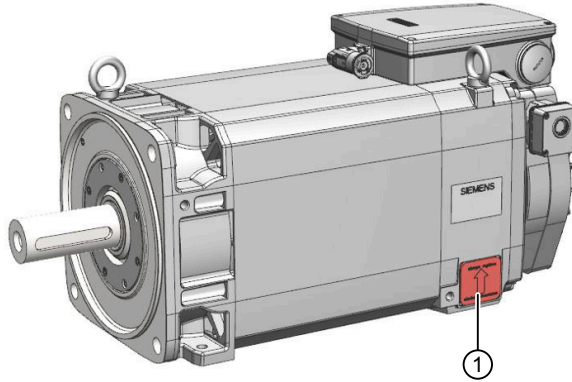
- Yapı şekli ve koruma türü açısından güç levhası bilgilerine uyun. Montaj yerindeki koşulların güç levhası bilgileriyle uyuşup uyuşmadığını kontrol edin.
- İzin verilen radyal ve eksenel kuvvetleri projelendirme elkitabında bulabilirsiniz.
- Montaj yerindeki koşullara (sıcaklık, kurulum yüksekliği) uygunluğunu kontrol edin.
- Milin ucundaki korozyona karşı koruyucu maddeleri güzelce temizleyin (standart deterjan kullanın).
- Flanş veya ayak bağlantısını dengeli bir şekilde yerleştirmeye dikkat edin. Gerdirmeler yasaktır.
- Milin ucu yukarıya doğru olarak yapılan dikey montajda üst depoya sıvı kaçmamasını sağlayın.
- Tahrik elemanlarını manuel olarak çevirin. Sürtünme seslerine dikkat edin. Sürtünme sesleri tespit ederseniz, nedenini gidirin veya üreticiye başvurun.

- Vidalanan kaldırma halkalarını taktıktan sonra sıkmaya veya sökmeye dikkat edin.
- Hava soğutmalı motoru, soğutma havası engellenmeden gelip gidebilecek şekilde kurun. Komşu parçaların hava giriş ve çıkış delikleriyle minimum mesafeyi koruyun ("Soğutma" bölümündeki "Minimum mesafeler" şekline bakın). Isıtılmış havanın emilememesini sağlayın.

Not

Motoru devreye sokmadan önce, ayakların kapaklarını takın.

- Hava soğutmalı motorlarda motoru sıkıca vidalamak için sökülen kapakları devreye sokmadan önce tekrar takmanız gerekir.



Resim 4-1 B tarafındaki ayak bağlantısı örtüsü ① (örnek)

4.2 Sabitleme

Sakin, titreşimsiz bir çalışmanın koşulları, DIN 4024 uyarınca temel tasarımı, motoru tam hizalama ve milin ucuna geçirilecek olan parçaların doğru dengelenmesidir.

Motor ayaklarından bağlantı (ayak bağlantısı)

Motor ayaklarının destek yüzeyi aynı düzlem üzerinde olmalıdır.

IMB3 veya IMB35 yapı şeklindeki (montaj ayaklı) 1PH motorlarının, düzlük spesifikasyonu $\leq 0,15$ mm olan düz yüzeylere monte edilmesi gerekir.

Makineyi düzgün kurmak için, gerektiğinde ayaklarının altına ince saclar yerleştirerek, makinede gerilme olmasını önleyiniz. Sacların adedi, mümkün olduğu kadar az olmalıdır; bunun için üst üste istiflenmiş mümkün olduğunca az pul kullanınız.

Flanş üzerinden bağlantı (flanş bağlantısı)

Not

Flanş sabitlemesi

Motor flanşın üzerine takıldığında, özel montaj öz frekanslarına sahip titreşebilir bir sistem oluşur. Bunlar çalışırken aşırı titreşimlere neden olabilir. Karşı önlem olarak motor ayrıca B tarafında da desteklenebilir. Motorun aşırı sallanmasını önleyin.

Sıkma torkları

Tablo 4-1 Ayak ve flanş bağlantısındaki sıkma torkları 1PH808

Sabitlenme türü	Cıvata ISO 4017	Disk ISO 7092	Sıkma torku, Nm ($\pm\%10$)
Ayak sabitlemesi	M8	8 (d2 = 15)	24
Flanş sabitlemesi	M10	10 (d2 = 18)	42
Sertlik sınıfı 8.8 veya daha yüksek cıvatalar kullanın			

Tablo 4-2 Ayak/flanş montajındaki sıkma torkları 1PH810

Sabitlenme türü	Cıvata ISO 4017	Disk ISO 7092	Sıkma torku, Nm ($\pm\%10$)
Ayak sabitlemesi	M10	10 (d2 = 18)	42
Flanş sabitlemesi	M12	12 (d2 = 20)	70
Sertlik sınıfı 8.8 veya daha yüksek cıvatalar kullanın			

Kuplaj çıkışı için düzgün ayarlama (doğrulma) hassaslığı

Motorun ve çalışma makinesinin millerinin izin verilen maksimum koaksiyellik sapması çapta 0,05 mm'dir.

4.3 Tahrik elemanlarının takılması

Balanslama

Rotorlar dinamik olarak dengelenmiş. Motorlar standart olarak düz bir mille donatılmıştır. Mil uçlarını poyra yaylarıyla dengelerken aşağıdaki uyarılara uyun:

- "H", yarım poyra yayı anlamına gelir = yarım poyra yayıyla balanslama
- "F", tam poyra yayı anlamına gelir = tam poyra yayıyla balanslama

Tahrik elemanlarının takılması

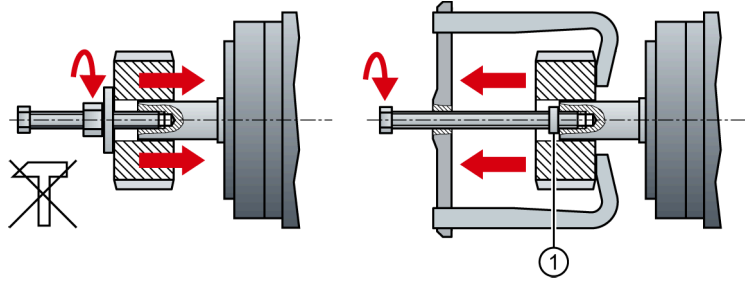
- İtici elemanın balans şeklinin doğruluğuna dikkat ediniz! ISO 1940'a göre, çıkış elemanlarının G2,5 dengeleme kalite derecesine göre dengelenmiş olması gerekir. Bunu aşan, çevresini saran kuvvetlere izin verilmez. Çevresinden geçen kuvvetlerin kavrama çıkışında da görülebileceğini unutmayın.
- "H" dengeleme türündeki çıkış elemanı poyra yayından kısaysa, dengeleme kalitesini korumak için poyra yayının mil konturundan ve çıkış elemanından dışarı taşan kısmının uzaklaştırılması gerekir.
- Çıkış elemanları ancak uygun donanım ile çıkarılabilir ve takılabilir:
 - Milin ucundaki dişli deliğini kullanın (ön taraf).
 - Gerekirse çıkış elemanını ısıtın.
 - Çıkartma sırasında, milin ucundaki merkezlemeyi korumak için ara pulu kullanın.

⚠ İKAZ

Dönen çıkış elemanlarında dokunmaya karşı koruma olmamasından kaynaklanan ölüm tehlikesi vardır

Açıktaki dönen çıkış elemanları ağır yaralanmalara neden olabilir.

- Açıktaki tüm çıkış elemanlarını dokunmaya karşı uygun bir korumayla örtün.



1 Ara pul (milin ucundaki merkezlemeyi korumak için)

Resim 4-2 Çıkış elemanlarını takma ve çıkartma

Çıkış elemansız motor**⚠ İKAZ**

Dışarı fırlayan poyra yaylarından kaynaklanan ölüm tehlikesi vardır

Mildeki poyra yayı ancak taşıma sırasında düşmemesi için korunmuştur. Mile açık bir şekilde yerleşen bir poyra yayı, çalışma sırasında dışarı fırlatılır.

Ölümcül yaralanmalara neden olabilir.

- Mile açık bir şekilde yerleşen poyra yayını çıkartın veya dışarı fırlatılmaya karşı emniyete alın.

4.4 Millerin doğrudan tahriki olarak montaj

Genel yöntem

1. Yatakların girişi

Motor gönderilmeden önce yatak gresinin iyice dağılmasını sağlamak için, yataklar fabrikada bir çalıştırma yönteminden geçirilir. Bu önlem, motor maksimum devir sayısına gelecek şekilde çalıştırılırken depolama hasarlarını önler. Ancak bununla, gres tabakasının ideal bir şekilde dağılması garanti edilmez. İdeal bir yağlama tabakası dağılımı tecrübeye göre ancak 30 saate kadar uzun bir süre çalıştırdıktan sonra gerçekleşir.

Motoru takmadan önce yatakların çalışmasını sağlayın. Bu gerekir

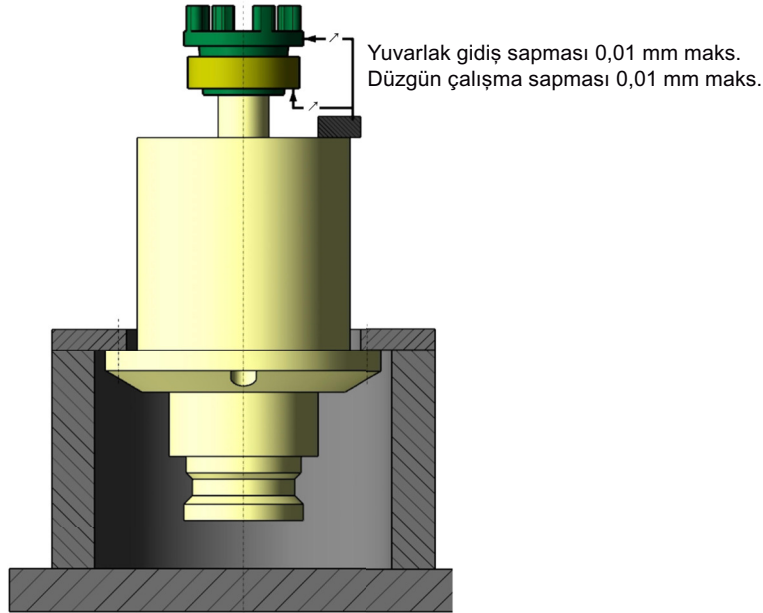
- yeni motorlarda
- uzun taşıma süresinden sonra
- uzun depolama süresinden sonra

Yatakları çalıştırırken arada bir yatak sesleri çıkabilir. Motor ne kadar uzun süre çalışırsa, yataklar da o kadar sessiz olur ve sonunda gürültü tam kaybolur.

2. Kavrama yarısını mile takma

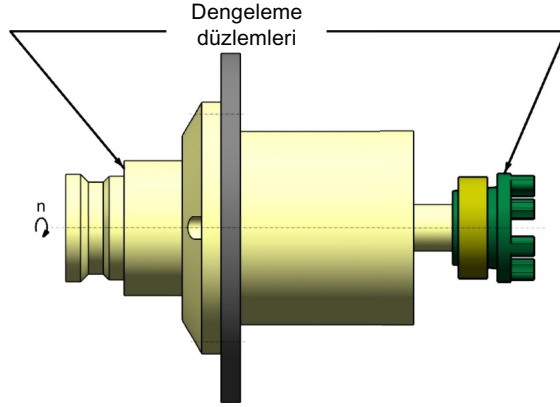
Kavramayla mil ekseninin arasındaki düz/yuvarlak gidiş sapması, kavrama yarısı takılıken milin ne kadar kolay çalıştığını belirler.

Belirtilen toleranslara uyun.

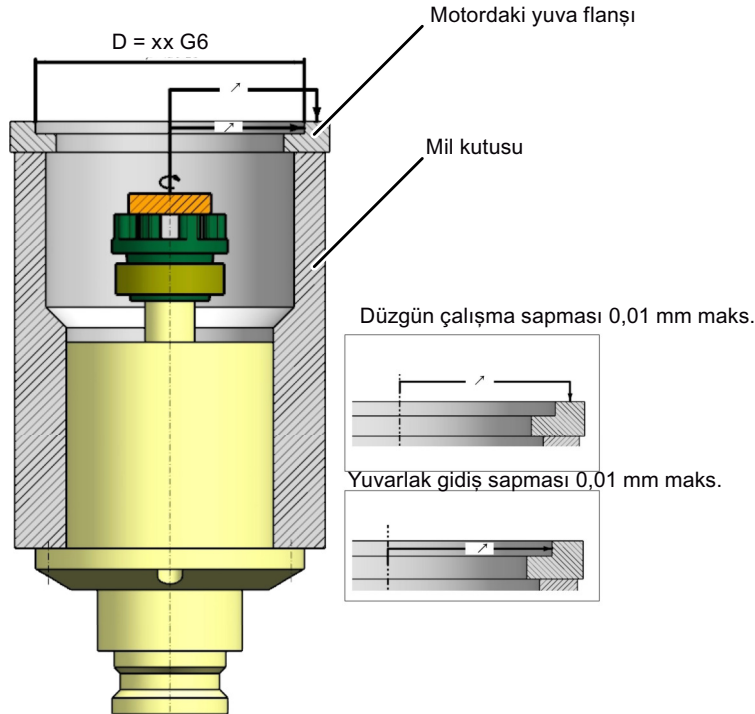


4.4 Millerin doğrudan tahriki olarak montaj

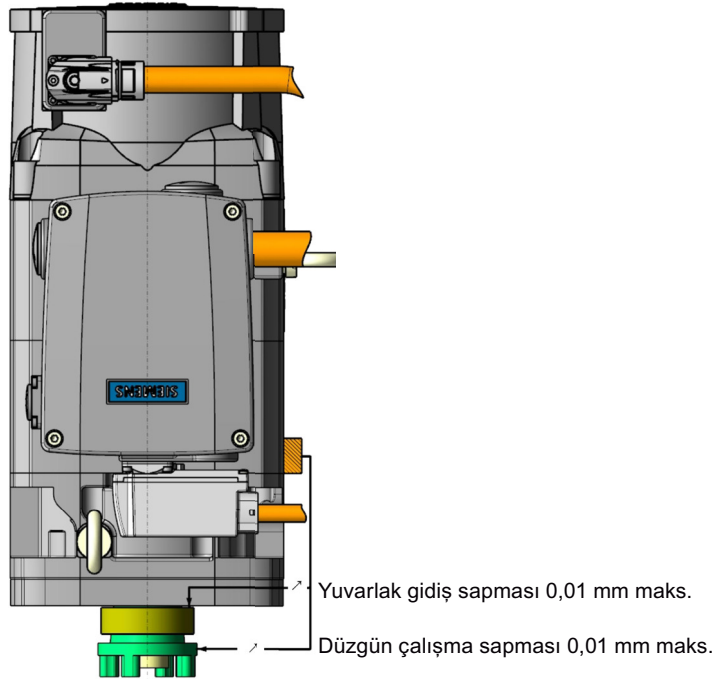
3. Mili kavrama yarısıyla tam dengeleme
Mili kavrama yarısı uygun bir tertibata takılıyken tam dengeleyin.
Artık balanssızlık $u = G1 \text{ g/mm}$



4. Mili mil çubuğuna takma
Motor milinin ve dişli milinin tam hizalandığından emin olmak için, motoru merkezleme kenarını hizalama flanşının hizalanması gerekir. Düz/yuvarlak gidiş sapmasının 0,01 mm değerini aşmamasını sağlayın.
Motoru merkezlemek için, motoru hizalama flanşı için bir G6 yuvası kullanmanız önerilir.

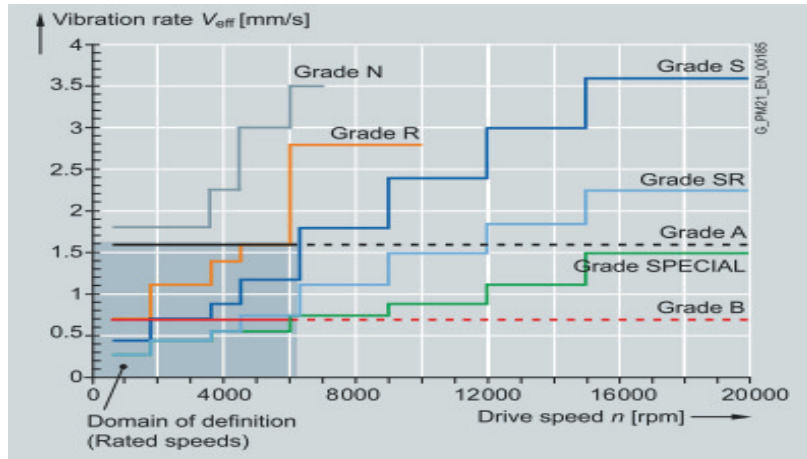


5. Kavrama yarisını motor miline takma



6. Motoru kavrama yarisı takılıyken tam dengeleme

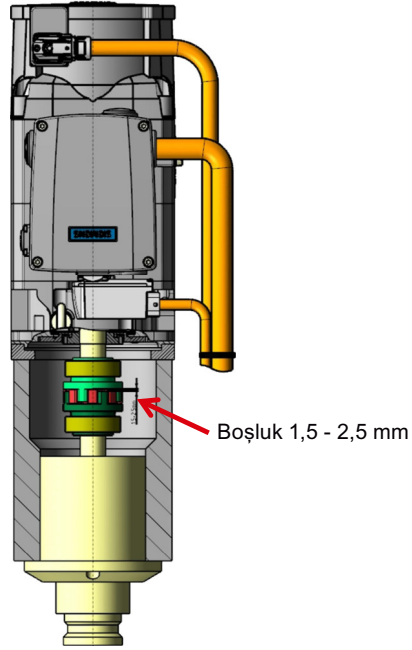
Motoru kavrama yarisı takılıyken tam dengeleyin. Hedef, motorun kavrama yarisı olmadığında göstereceği aynı titreşim büyüklüğüne ulaşmaktır. Tam dengelemeyi "Premium performans" yatak modelindeki dengeleme (Sayfa 50) bölümüne göre gerçekleştirin.



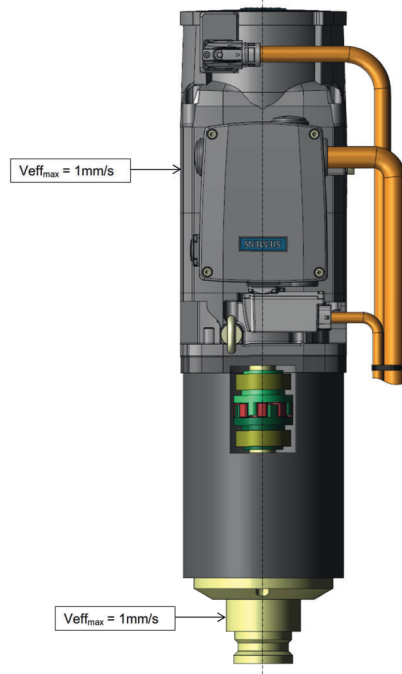
4.4 Millerin doğrudan tahriki olarak montaj

7. Motoru mil çubuğuna takma

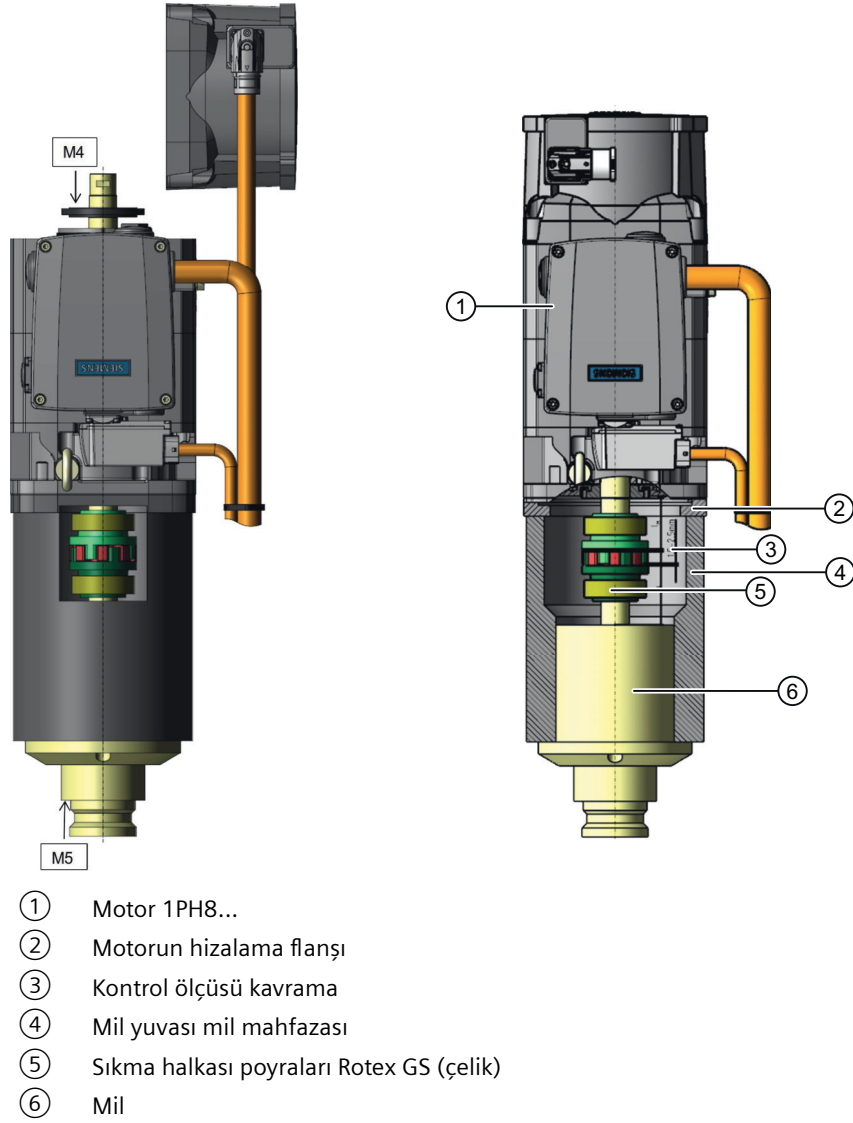
Motorun mile takılmasından doğan zorunlu kuvvetlerin önlenmesi için, kavramada 1,5 ile 2,5 mm arasında aks boşluğu olması gerekir.



8. Bütün tahrik şeridinin kolay işlerliğinin kontrolü
Memnun edici bir kolay işlerlik ve uzun bir depolama ömrü sağlamak için, titreşim hızı için belirtilen değerlerin, tahrik şeridi boyunca hiçbir noktada aşılmaması gerekir.



9. Bütün tahrik şeridini dengeleme
Titreşim hızı için belirtilen değerlere ulaşılmadığında, bütün tahrik şeridinin dengelenmesi gerekir.



4.5 "Premium performans" yatak modelindeki dengeleme

Kullanım yerindeki, çıkış elemanları, montaj durumları, hizalama ve kurulumdan ve yabancı titreşimlerin etkilerinden kaynaklanan mekanik sistem titreşimi davranışı, motordaki titreşim değerlerinin artmasına neden olabilir. Duruma göre rotorun, tahrik çıkış elemanı ile birlikte komple balans işlemine tabi tutulması gerekebilir.

1PH8 motorları, "özel" titreşim kalitesinde teslim edilir. Kavrama elemanlarını milin ucuna takmak, rotorun dengeleme durumunu değiştirir. Bu nedenle, kavrama elemanlarının montajından sonra rotorun tam dengelenmesi gerekir. Aşağıdaki açıklamada örnek olarak, "Premium performans" yatak modelli 1PH8 motorlarının yöntemi gösterilmiştir. Titreşim kalitesini ve dengesizlik konumunu ölçüm tekniğiyle tespit etmeniz gerekir. Ardından dengesizliği giderebilirsiniz.

Gereken ölçme cihazı

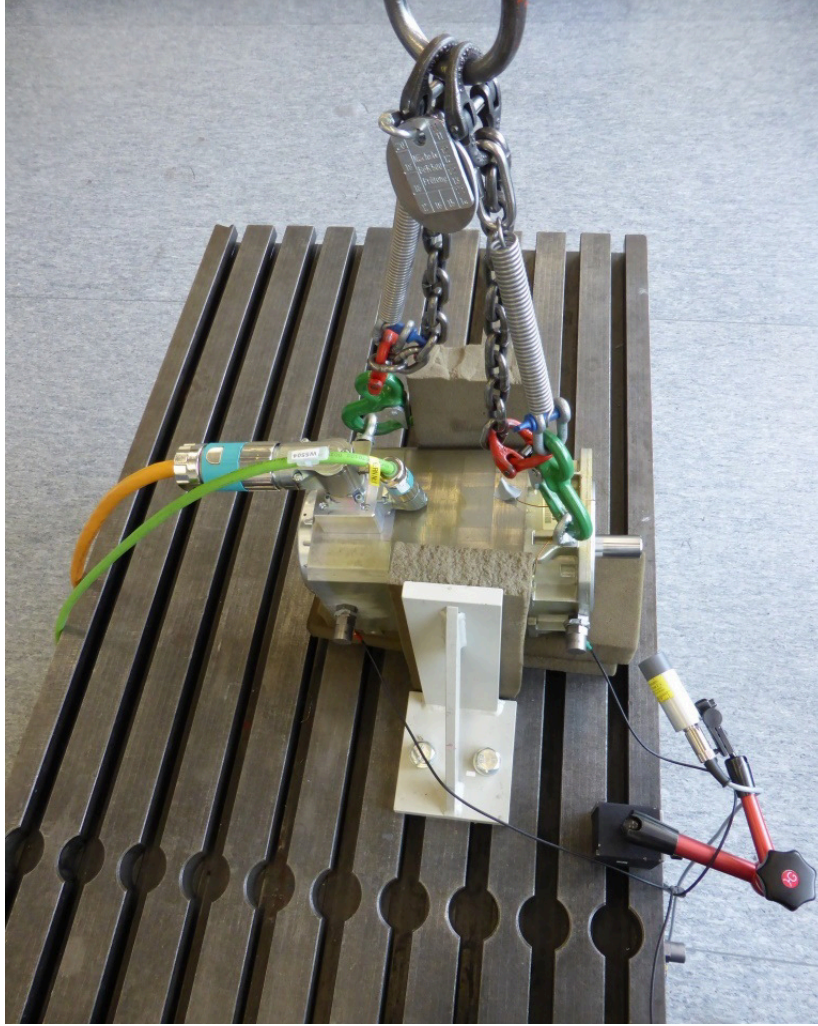
2 kanallı titreşim ölçüm cihazı

Frekans bandı genişliği: 10 Hz ... 1000 Hz

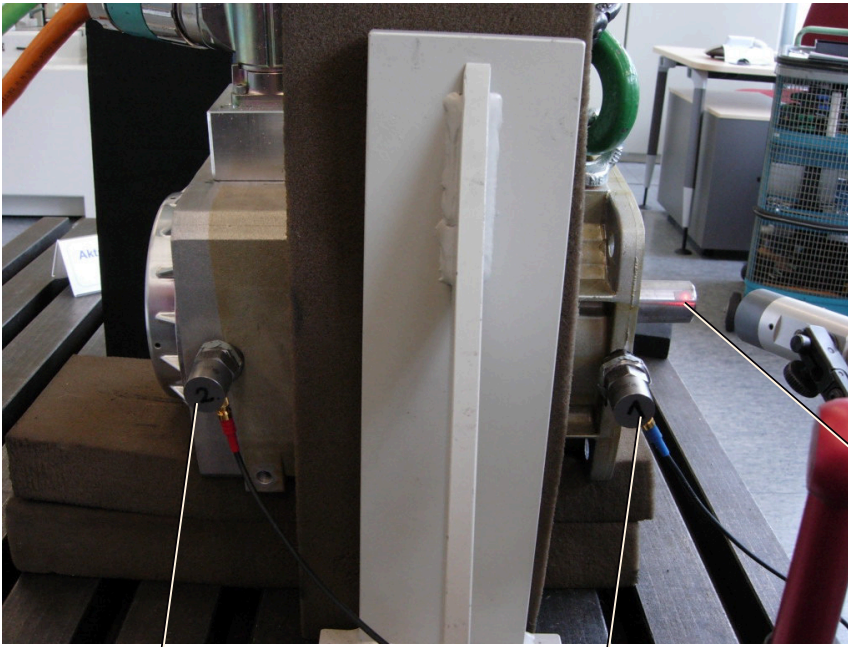
Ölçme cihazının, düzen analizi için bir fonksiyonla donatılmış olması gerekir. BU işleyle dengesizliği (titreşim oranı 1. düzeni) gösterebilirsiniz.

Örnek yöntem

1. Referans ölçümünü hazırlayın. Motoru IEC 60034-14'e göre serbest bir askıya getirin. Motor-yay sisteminin kendi frekansının 3 Hz'den küçük olması gerekir. Bu nedenle, motorun kütlesine uyarlanmış yaylar kullanın. Motorun serbest bir şekilde asılması, referans ölçümünün bozulmayan bir ölçüm sonucu için gerekir.



2. Mili (AS), devir sayısı ve açığı tanıma için bir referans işaretiyle donatın.

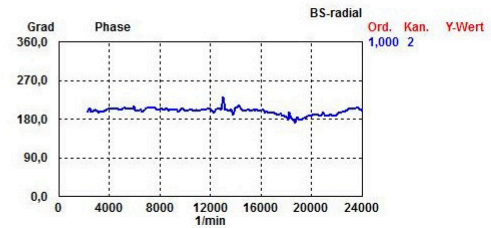
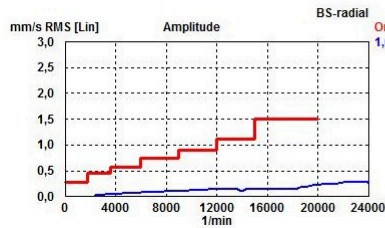
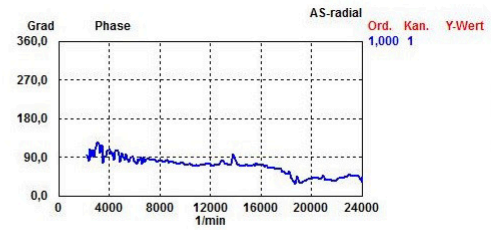
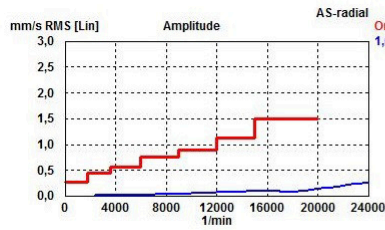


Devir sayısını ve açığı tanıma için referans işareti

Sensör 2: DE Ch2

Sensör 1: DE Ch1

3. Ölçüm sensörlerini yerleştirin: A tarafı için sensör 1, B tarafı için sensör 2.
4. A ve B tarafı için serbest şekilde asılan motorda referans ölçümünü gerçekleştirin. Dengesizlik tutarını ve açı konumunu ölçün (1. düzen).

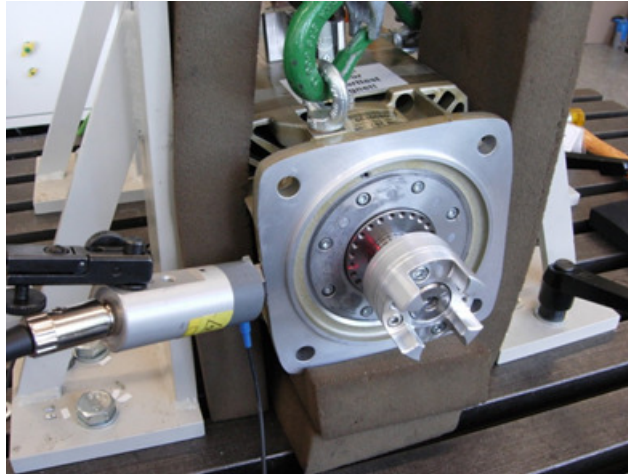
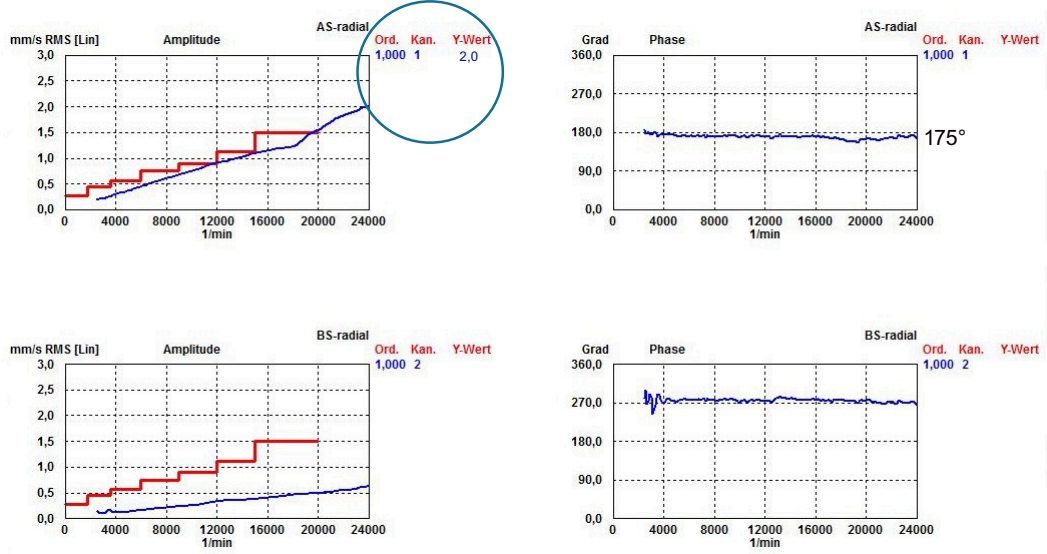


5. Kavramayı milin ucuna (A tarafı) takın.

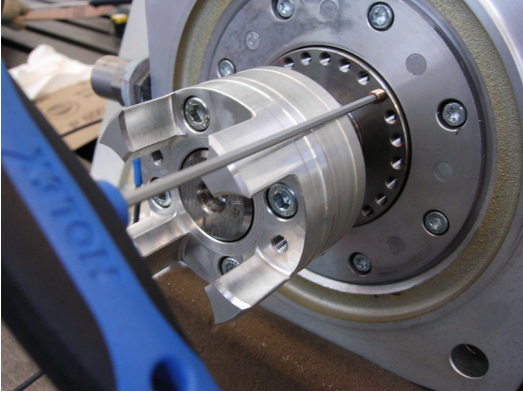
4.5 "Premium performans" yatak modelindeki dengeleme

6. Şimdi A ve B tarafı için bağlı motordaki ölçümü gerçekleştirin. Bunun için dengesizlik tutarını ve açi konumunu da ölçün (1. düzen).

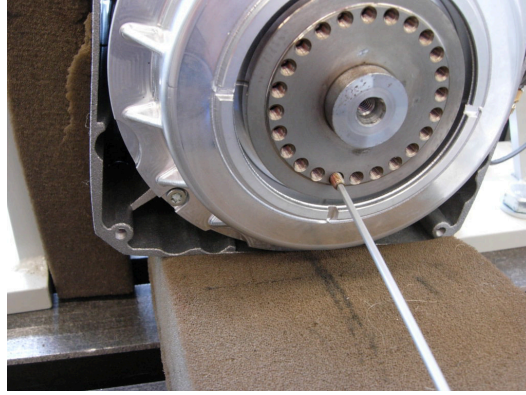
en büyük tutarı



7. Dengesizliği dengeleyin. Bunun için rotora bir veya birden fazla eşitleme vidası vidalayın. Dengesizlik için en büyük tutarın olduğu tarafta başlayın. Örneğin A tarafında 175° açıda bir dengesizlik varsa, karşı tarafına 355° açısında bir eşitleme vidası ($175^\circ + 180^\circ = 355^\circ$) vidalamanız gerekir.



Eşitleme vidasını DE tarafına vidalayın



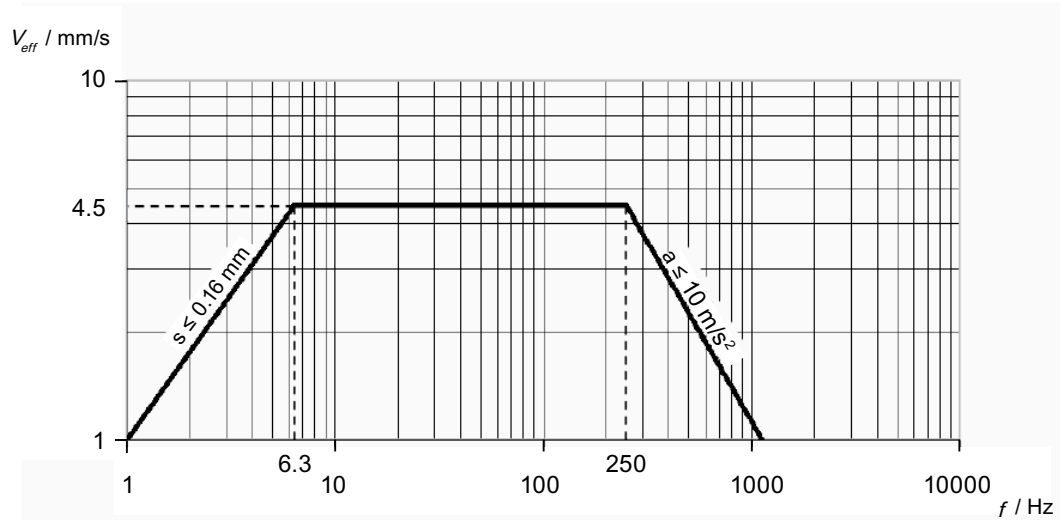
Eşitleme vidasını NDE tarafına vidalayın

8. Dengesizlik tamamen eşitlenene kadar gerekirse 6. ve 7. noktayı birkaç kez tekrarlamanız gerekebilir.



4.6 Titreşim karakteristiği

Titreşim büyüklüğü kademesi



Resim 4-3 Titreşim yolu ve titreşim ivmelenmesi dikkate alınarak izin verilen maksimum titreşim hızı

4.7 Döner girişleri 1PH8 içi boş mil motorlarına takma

Titreşim hızının değerlendirilmesi için ilgili ölçüm tertibatı ISO 2954 gereksinimlerini karşılamalıdır. Titreşim ivmelenmesinin değerlendirilmesi, 10 ila 2000 Hz frekans bandında ilgili zaman aralığında tepe değeri olarak gerçekleşmelidir.

2000 Hz üzerinde kayda değer titreşim uyarıları (örneğin dişli kavrama frekansları) beklenebiliyorsa, ölçme alanının da gerektiği gibi uygun hale getirilmesi gerekir. İzin verilen maksimum titreşim değerleri bundan dolayı değişmez.

Titreşim karakteristiği

Kullanım yerindeki, çıkış elemanları, montaj durumları, hizalama ve kurulumdan ve yabancı titreşimlerin etkilerinden kaynaklanan mekanik sistem titreşimi davranışı, motordaki titreşim değerlerini artırabilir.

Gerekirse motoru çıkış elemanı ile komple dengeleyin.

Kusursuz çalışma ve uzun bir kullanım ömrü nedeniyle, ISO 10816'ya göre belirtilen titreşim değerlerine uyun.

Tablo 4-3 İzin verilen maksimum radyal titreşim değerleri ¹⁾:

Titreşim frekansı	Titreşim değerleri
< 6,3 Hz	Salınım yolu $s \leq 0,16$ mm
6,3 ... 250 Hz	Titreşim hızı $v_{\text{eff}} \leq 4,5$ mm/sn
> 250 Hz	Titreşim hızlanması $a \leq 10$ m/sn ²

1) Aynı anda her iki değere de uyulması gerekir.

Tablo 4-4 İzin verilen maksimum radyal titreşim değerleri¹⁾:

Titreşim hızı	Titreşim ivmelenmesi
$v_{\text{eff}} = 4,5$ mm/sn	$a_{\text{tepe}} = 2,25$ m/sn ²

1) Aynı anda her iki değere de uyulması gerekir.

4.7 Döner girişleri 1PH8 içi boş mil motorlarına takma

Genel

İç i oyuk milli 1PH8 ana motorlar (sipariş numarasının 13. basamağı: "3"), alet makinelerinin ana mil motorları ve alet iç soğutmalı işleme merkezleri olarak belirlenmiştir. Soğutucu yağlama maddesini dönen motor milinde ayarlamak için bir döner giriş gerekir. NDE milin ucuna rotorla taşınan veya motor, Y64 seçeneğiyle sipariş edildiğinde yataksız, mahfazayla taşınan bir döner giriş takılabilir. Soğutucu yağlama maddelerinin yanında uygun döner girişler, yağ sisleri (asgari miktarda yağlama), kesme yağları veya durma sırasında basınçlı hava da aktarabilir.

Rotorla taşınan döner girişler, aşağıdaki bileşenlerden oluşur:

- Yataklı rotor
- Stator

- Hat bağlantılarıyla mahfaza
- KAYAR HALKA CONTA

Rotorla taşınan döner girişlerin takılması ve değiştirilmesi kolaydır. Bunlar rotordaki dişliden motor miline vidalanır. Bu döner girişlerin avantajı, sızıntının mahfaza ve entegre sızıntı bağlantısı üzerinden uzaklaştırılmasıdır.

Yataksız, mahfazayla taşınan döner girişler, salmastralı rotor ve salmastralı ve besleme bağlantılı stator şeklinde iki ayrı parçadan oluşur. Eksik depolamadan dolayı daha yüksek devir sayıları elde edilebilir ve döner giriş, titreşimlere ve yandaki yüklere karşı daha duyarsızdır. Ancak döner girişi takmak için, böl. "Yataksız mahfazayla taşınan döner girişler için adaptör teklifi" gibi bir adaptör gerekir.

Sürgülü halkanın conta yüzeyleri korumasız olduğundan, takma işlemi çok dikkatli bir şekilde gerçekleştirilmelidir.

Rotor, motor milinin NDE tarafına vidalanır. Stator, bir adaptörle motorun verici kapağına takılır. Adaptörde bir sızıntı çıkışı gerçekleştirilmelidir. Adaptör, sızıntı durumunda motor sel altında kalmayacak ve motorun koruma türüne uyulacak şekilde tasarlanmalıdır. Gerekirse kapatma havası kullanılmalıdır.

Yataksız bir döner girişi kullanmak için, Y64 seçenekli motor sipariş edilmeli ve veri kapağındaki arabirim mile konsantrik olarak ayarlanmalıdır. Döner giriş üreticisinin montaj koşullarına uyulmalıdır.

Döner girişlerin modeline bağlı olarak conta halkaları sürekli veya geçici olarak mevcut olur.

Kapalı bir conta örneği: DEUBLIN serisi 1116 ve 1108

Açılan bir conta örneği: DEUBLIN serisi 902 ve 1109

Conta açıldığında, sıvı basıncı yoksa, örneğin alet değiştirme sırasında conta yüzeyleri ayrılır. Bu sırada soğutucu yağlama maddesi, besleme hattından ve motor milinden dışarı akarak açık contadan geçer. Bu sızıntı ve conta halkalarının aşınmasından kaynaklanan sızıntı da sızıntı hatları üzerinden uzaklaştırılmalıdır.

DİKKAT

Yanlış takılan sızıntı hattından kaynaklanan motor arızası

Sızıntı hattı aşağıya dönük değilse, sızıntı döner girişi ve motoru su altına bırakabilir. Bundan dolayı döner giriş ve motor arızalanabilir.

Sızıntıyı güvenli bir şekilde uzaklaştırmak için, geriye akmaları önlemek için sızıntı hattının her zaman aşağıya doğru gitmesi gerekir.

- Montaj sırasında, sızıntı hattının her zaman aşağıya gitmesine dikkat edin.

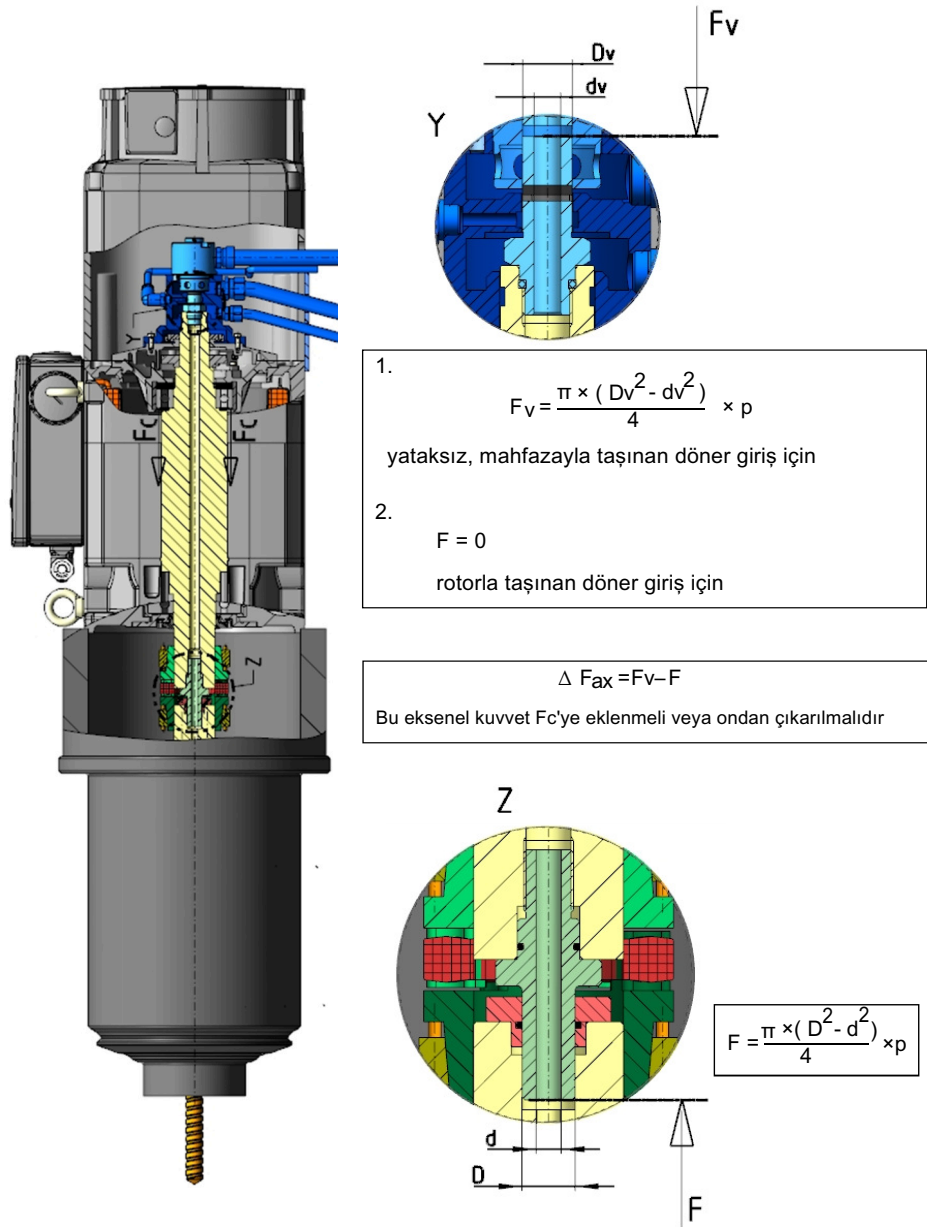
DİKKAT

Soğutucu basıncından kaynaklanan aksenal kuvvetler

Takılan döner girişinden, tahrik demetinde birbirini izleyen deliklerden (normalde 40 ile 90 bar arası) yüksek basınçla soğutucu akar:

- Döner girişi
- Motor
- Mil
- Alet.

Farklı delik çapları ve soğutucu akışı boyundaki sütun sayesinde, soğutucu basıncıyla aksenal kuvvetlerin oluşabileceği farklı çaprazlamasına kesimler (yüzeyler) oluşur. Bunlar, soğutucu basıncına bağlı olarak, 4 ile 12,7 N/mm² arasında olabilir.



Resim 4-4 Döner girişi takma

"Döner girişi takma" grafiğinden, örneğin motor miliyle (içi boş vida) dişli mili arasındaki aralıkta aralık basıncını aşan bir eksenel kuvvet oluştuğu anlaşılır. Bu, motor milini yatak dayama kuvvetine F_c karşı etkiler. Bu sayede motor yatağının dayama kuvveti azaltılır ve hatta ortadan kaldırılır.

Yataksız, mahfazayla taşınan döner girişlerde içteki farklı delik çaplarına bağlı olarak eksenel kuvvetler de oluşabilir ve bunlar, derzdekilerin tersine etki gösterebilir ve bu sayede yatak dayama kuvvetini daha az etkileyebilir. Döner girişteki eksenel kuvvetlerin, derzdekilerden daha yüksek olmasına dikkat edilmelidir (Olay 1 grafiğine bakın). Bunun avantajı, yatak dayama kuvvetinin değişmeden kalmasıdır. Yatak dayama kuvveti, motor yataklarının kaymadan çalışması için önemlidir ve kaldırılmaması gerekir.

4.7 Döner girişleri 1PH8 içi boş mil motorlarına takma

Rotorla taşınan döner girişlerde bu avantaj yoktur. Motor yataklarının dayama kuvvetinin kaldırılmamasına dikkat edilmelidir (bakın grafik "Döner girişi takma", olay 2). Motor yönündeki eksenel kuvvet, motor yatay olarak takıldığında $F_{AZ} = F_c \pm 25\%$ aralığında ve motor dikey olarak takıldığında da mil ucu altta olarak $F_{AZ} = (F_c \pm 25\%) + F_L$ aralığında olmamalıdır. Milin ucunda izin verilen maksimum eksenel kuvvetler için "Radyal ve eksenel kuvvetler" bölümündeki bilgiler geçerlidir. Döner girişte etki eden eksenel kuvvetlerin üreticiye sorulması gerekir.

İçi boş milin modeli

Tablo 4-5 İçi boş milin modeli

	1PH808□	1PH810□
DE'deki dişli	M12 x 1,25-RH	M16 x 1,5-RH
DE'deki merkezleme	Ø16H7	Ø20H7
NDE'deki dişli	M12 x 1,25-LH	M16 x 1,5-LH
NDE'deki merkezleme	Ø14 +0,008/-0,001	Ø18 +0,007/-0,003
Geçiş deliği	Ø8	Ø11,5
Anahtar yüzeyi NDE	SW19	SW27

4.7.1 Rotorla taşınan döner giriş

DİKKAT**Döner girişteki sızıntılar**

Döner girişteki ve hortumlardaki sızıntılarda motor su altında kalabilir ve arızalanabilir!

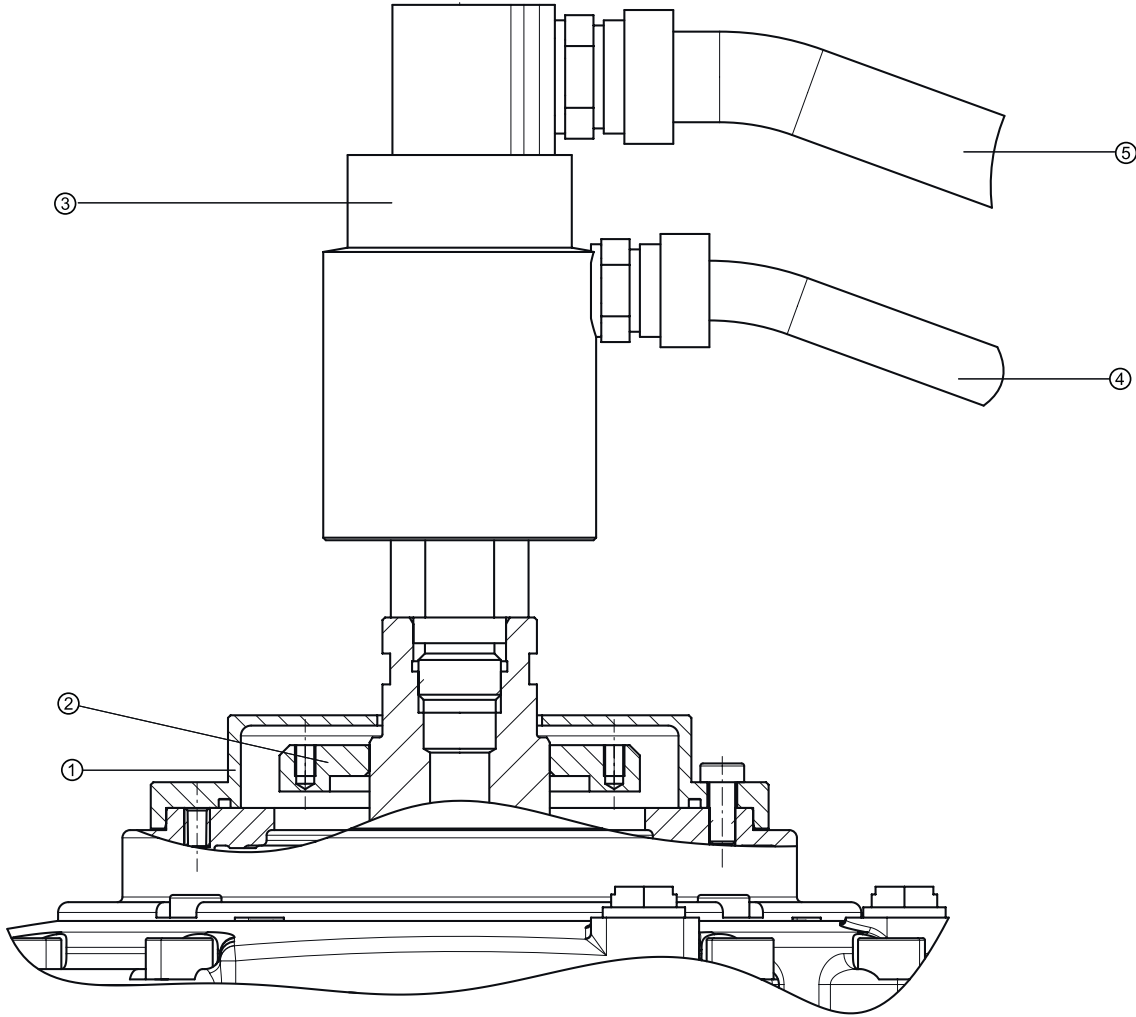
- Döner girişteki sızıntıları önleyin.

Döner girişi takma sırasında aşağıdaki noktalara uyun:

- Döner girişi takarsanız, hava ile su soğutmalı motorların arasındaki özelliklere dikkat edin.
- Döner girişin montajı sırasında üretici bilgilerine uyun.

Su soğutmalı motora montaj

Su soğutmalı motorların sipariş numarasının 11. basamağında bir "2" vardır. Su soğutmalı motorlarda döner girişi doğrudan motora takabilirsiniz. Radyal veya eksenel bağlantılı döner girişler kullanın.

Rotorla taşınan döner girişin su soğutmalı motorlara montajı

- ① Conta kapağı
- ② Dengeleme diski
- ③ Rotorla taşınan döner giriş, örneğin DEUBLIN 1109-020-188
- ④ Hortum sızıntısı
- ⑤ Hortum girişi

Hava soğutmalı motorlara montaj

Hava soğutmalı motorların sipariş numarasının 11. basamağında bir "0" veya "1" vardır. Hava soğutmalı motorlar için motorla eksenel olarak takılan fanın arasında bir ara mahfaza olması gerekir. Ara mahfaza, döner girişin yerleştirilmesi için kullanılır.

Ara mahfaza, aşağıdaki ölçülere sahip olan döner girişler için uygundur:

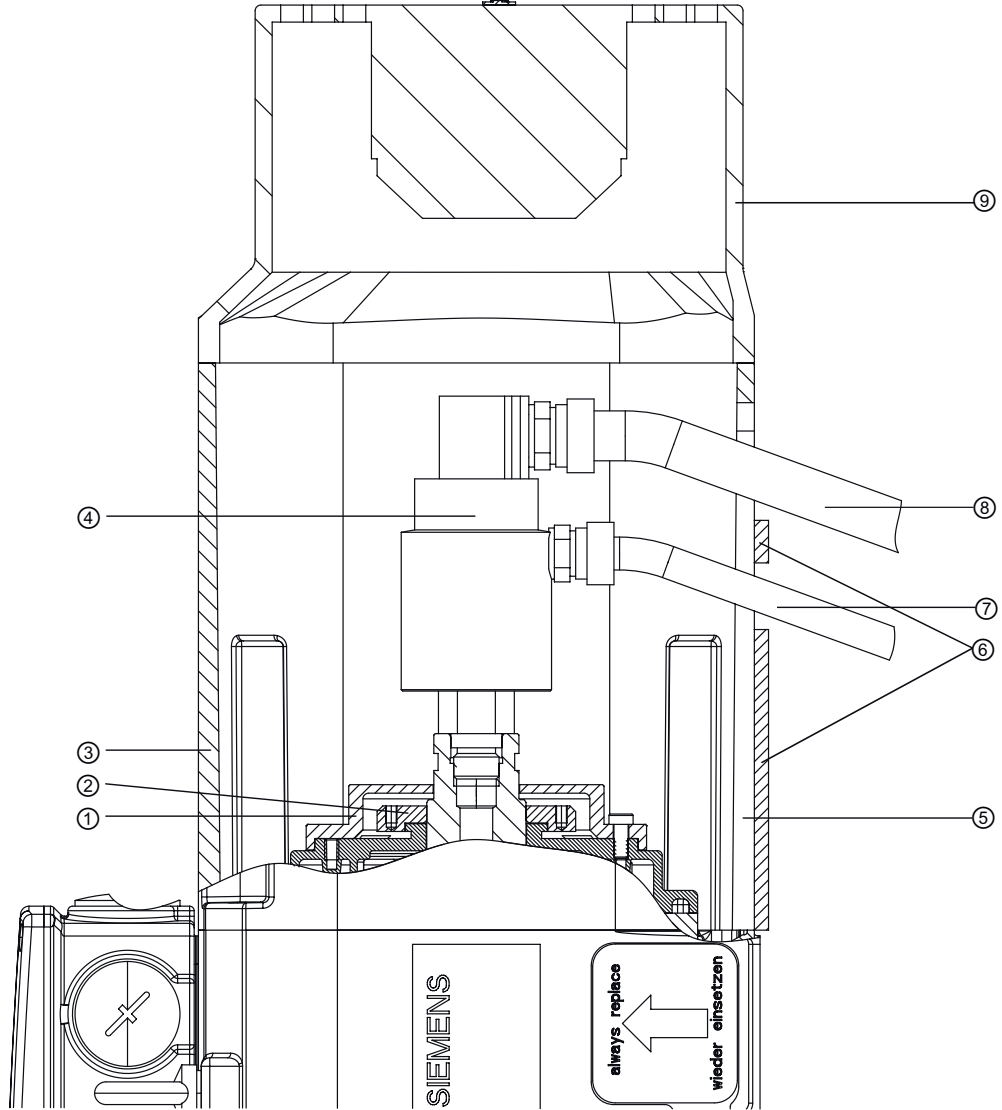
- Maksimum 120 mm uzunluk (rotor bağlantı dişlisiz ve merkezlemesiz)
- Maks. 55 mm çap

4.7 Döner girişleri 1PH8 içi boş mil motorlarına takma

Hava soğutmalı motorlarda yer nedenlerinden ötürü radyal bağlantıları olan döner girişler mantıklı olur, örneğin DEUBLIN 1109-020-188.

Eksenel bağlantılı döner girişleri uygun değildir!

Rotorla taşınan döner girişin hava soğutmalı motorlara montajı



- ① Conta kapağı
- ② Dengeleme disk
- ③ Ara mahfaza
- ④ Rotorla taşınan döner giriş, örneğin DEUBLIN 1109-020-188
- ⑤ Girinti
- ⑥ Kapak (bağlantıların deliklerinin kapanması gerekir)
- ⑦ Hortum sızıntısı
- ⑧ Hortum girişi
- ⑨ Fan

Not

Hava soğutmalı motorları bağlama sırasında ancak radyal bağlantılı döner dağıtıcılar kullanılabilir.

Montaj adımları**Yöntem****Not****Hava soğutmalı motorların montaj adımları**

Montaj adımı 1, 11, 12, 13 ve 14 sadece hava soğutmalı motorlarda gerekir.

1. Fanı ve ara mahfazayı motordan sökün
2. Gerekirse motorun bir komple dengelenmesini dıştaki dengeleme diskleriyle gerçekleştirin. Bunun için conta kapağını sökün.

Not**Conta kapağı**

- Dengelemeden sonra conta kapağını tekrar takın.
- Koruma türüne uymak için conta kapağı gerekir.

3. Giriş ve sızıntı hortumlarını döner girişe takın. Gerekirse aç parçaları kullanın.

Not**Kullanılacak olan döner giriş**

- Radyal bağlantılı bir döner giriş kullanın.

4. Döner girişi NDE motor mili ucuna vidalayın. Döner girişi söz konusu momentle sıkın. Bunun için, karşı tutma için NDE motor mili ucundaki anahtar yüzeyini kullanın.
5. Bu sırada döner girişi, sızıntı bağlantısı en derin noktada olacak şekilde yatay olarak yerleştirin.
6. Sızıntı için hortumu her zaman yamaçta minimum 15° aşağıya doğru olarak döşeyin.
7. Giriş hortumunu da aşağıya doğru döşeyin.
8. Sızıntı odası için gerekirse bir havalandırma hortumu hazırlayın. Fanın oluşturduğu alçak basıncı dengeler. Havalandırma hortumunu dışarıya uzatın.
9. Rotorun kolay çalışmasını elle kontrol edin.
10. Yapının basınç altındaki sızdırmazlığını kontrol edin.
11. Ara mahfazayı, giriş ve sızıntı hortumları için ızgarasız bir girintiyle donatın.
12. Ara mahfazayı girintisiyle hortumların üzerine itin. Ara mahfazayı motora vidalayın. Hortumları mekanik yüklerden koruyun.

13. Fanı ara mahfazaya vidalayın.
14. Girintiyle hortumların arasında kalan delikleri kapatın.



4.7.2 Yataksız, mahfazayla taşınan döner giriş

Yataksız, mahfazayla taşınan döner giriş doğrudan motora takılamaz. Döner girişin statoru için bir adaptör gerekir. Adaptör, teslimat kapsamına dahil değildir ve müşteri tarafından, kullanılacak olan döner girişe göre hazırlanması gerekir.

Lütfen aşağıdaki tasarım uyarılarına uyun:

- Statoru kaydetme adaptörünün kullanılan döner girişe göre ayarlanması gerekir. Bunun için, döner giriş üreticisinin ölçü bilgilerine uyulmalıdır. Adaptörün, "Yataksız, mahfazayla taşınan döner girişler için adaptör teklifi" bölümünde belirtildiği şekilde tasarlanması gerekir.
- Dışarı çıkan soğutucu yağlama maddesinin motora kaçmaması için, adaptörle milin ucu arasındaki radyal aralığın olabildiğince küçük (yakl. 0,25 mm) ve eksenel olarak olabildiğince uzun olarak hazırlanması gerekir. Sızıntı bağlantıları olabildiğince büyük olarak tasarlanmalı ve sızıntı odasının en derin yerine ayarlanmalıdır. Döner girişin statoruna daha yakın olan sızıntı bağlantısı (G3/8"), işletme sızıntısını uzaklaştırmak için tasarlanmıştır. İkinci sızıntı bağlantısı (G1/4"), yedek veya arızalarda artan sızıntıyı uzaklaştırmak için öngörülmüştür.

DİKKAT

Yedek hattın denetimi

Döner girişteki bir arızayı vaktinde fark etmek ve motoru su altında kalmaya karşı korumak için, yedek hattın akış miktarının kontrol edilmesi gerekir.

- Bir sızıntı oluştuğunda bir sinyal verilmesini sağlayın.
- Arıza durumunda tesisin (soğutucu yağlama maddesi girişi) kapatılmasını sağlayın.

- Verici kapağıyla dengeleme diski arasındaki labirentten motorun içine sıvı girememesi için, verici kapağının montaj alanındaki yıldız şeklindeki çıkış deliklerinin "Yataksız, mahfazayla taşınan döner girişler için adaptör teklifi" bölümündeki şekilde tasarlanması gerekir. Motor dikey olarak takıldığında, tüm 6 çıkış deliği de uygulanmalıdır, yatay olarak takıldığında ise alttaki iki çıkış deliğinin uygulanması yeterli olur.

Not

Motorun içine soğutucu yağlama maddesi kaçmasını önlemek için bir kapatma havası bağlantısı hazırlanması mantıklı olur.

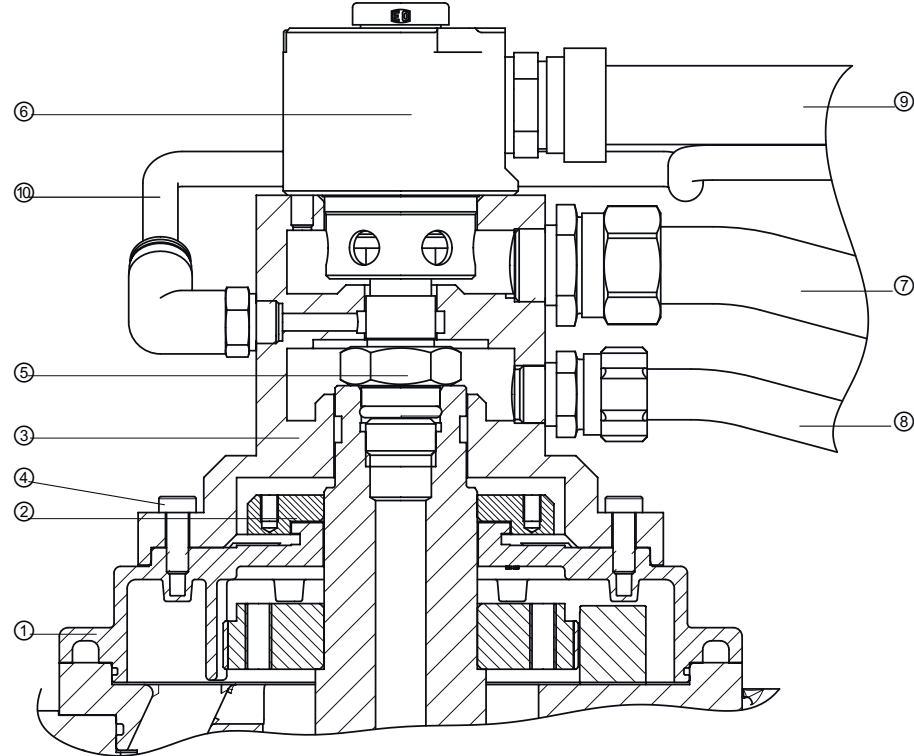
- Verici kapağını ve döner girişinin statorunu almak adaptöründeki çapın ve düz yüzeylerin olabildiğince bir gerdirmede çevrilmesi gerekir. Daha kolay işlemek için adaptör, eksenel olarak bölünmüş şekilde tasarlanabilir. Alma çapının ve düzlem yüzeylerinin hazır işleminin, bir çıkıntıda takılı durumda yapılması önemlidir.

Su soğutmalı motora montaj

Su soğutmalı motorların sipariş numarasının 11. basamağında, Y64 seçeneğiyle birlikte bir "2" vardır.

Radyal veya eksenel bağlantılı döner girişler kullanılabilir.

Yataksız bir döner girişin su soğutmalı bir motora montajı



- 1 Sensör kapağı
- 2 Dengeleme disk
- 3 Adaptör
- 4 6 x M5 cıvatası
- 5 Döner girişin rotoru, örneğin DEUBLIN 1129-050-301
- 6 Döner girişin statoru, örneğin DEUBLIN 1129-050-301
- 7 Hortum sızıntısı (içte min. Ø 12 mm)
- 8 Yedeğe kadarki veya arızalardaki hortum sızıntısı
- 9 Hortum girişi
- 10 Kapatma havası bağlantısı

Hava soğutmalı motorlara montaj

Hava soğutmalı motorların sipariş numarasının 11. basamağında, Y64 seçeneğiyle birlikte bir "0" veya "1" vardır.

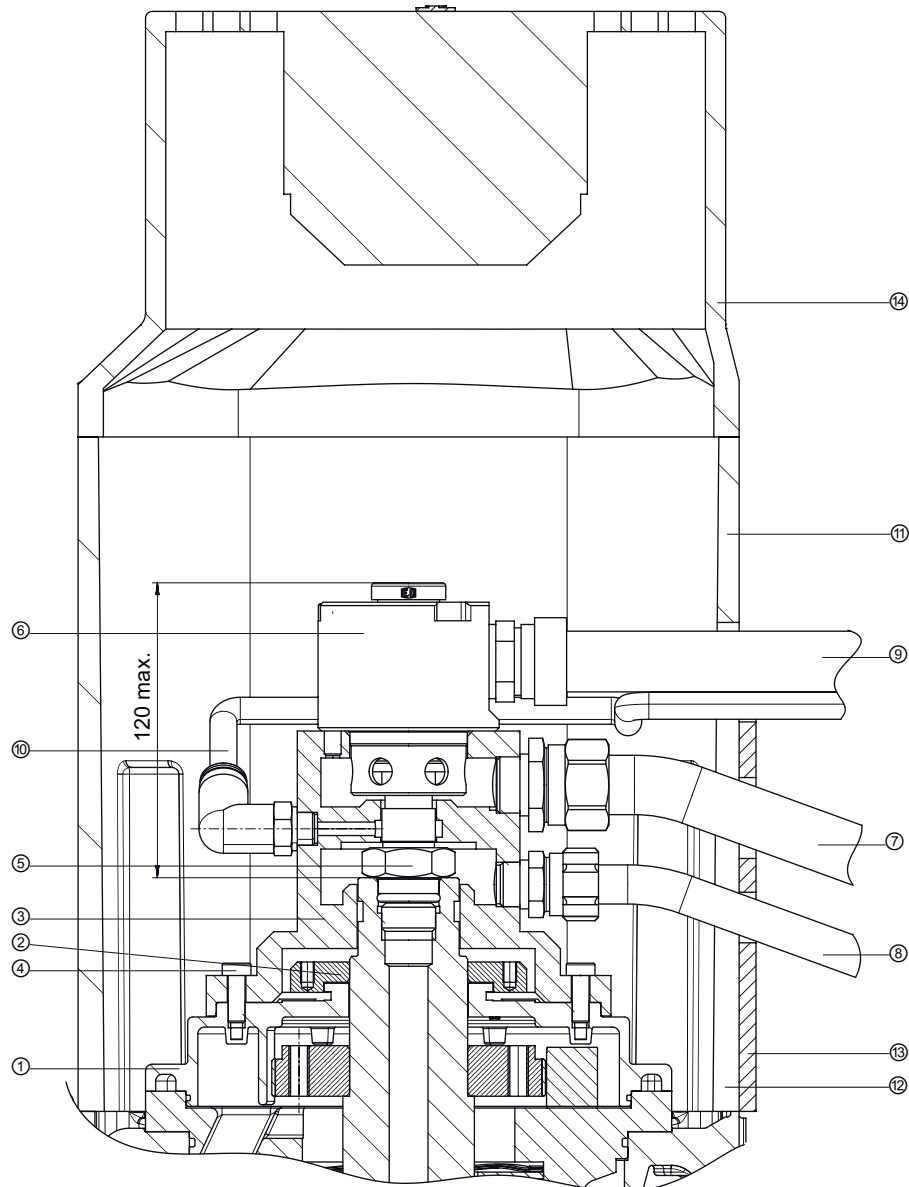
4.7 Döner girişleri 1PH8 içi boş mil motorlarına takma

Hava soğutmalı motorlar, motorla eksenel olarak takılan fanın arasındaki bir ara mahfazayla donatılır. Ara mahfaza, döner girişin yerleştirilmesi için kullanılır. Uzunluğu (rotor bağlantı dişlisi ve merkezlemesi olmadan) en fazla 120 mm ve çapı da maksimum 55 mm olan döner girişler için uygundur. Hava soğutmalı motorlarda yer nedenlerinden ötürü radyal bağlantıları olan döner giriş önerilir, örneğin DEUBLIN 1129-050-301. Eksenel bağlantıları olan döner girişler, kısa modellerde de mümkündür, örneğin DEUBLIN 1129-730-731. Bunun için, eksenel bağlantıda besleme hortumunun bağlı olduğu bir aç parçası kullanılmalıdır. Aç parçasıyla 120 mm ölçüsü aşılmamalıdır.

DİKKAT
Kalan delikleri kapatma
Motoru soğutmaya devam edebilmek için, girintiyle hortumların arasında kalan delikleri tekrar kapatın.

Yataksız bir döner girişin hava soğutmalı bir motora montajı

4.7 Döner girişleri 1PH8 içi boş mil motorlarına takma



- | | | | |
|---|---|----|--|
| 1 | Sensör kapağı | 8 | Yedeğe kadarki veya arızalardaki hortum sızıntısı |
| 2 | Dengeleme diski | 9 | Hortum girişi |
| 3 | Adaptör | 10 | Kapatma havası bağlantısı |
| 4 | 6 x M5 civatası | 11 | Ara mahfaza |
| 5 | Döner girişin rotoru, örneğin DEUBLIN 1129-050-301 | 12 | Kesit |
| 6 | Döner girişin statoru, örneğin DEUBLIN 1129-050-301 | 13 | Kapak (bağlantıların deliklerinin kapanması gerekir) |
| 7 | Hortum sızıntısı (içte min. Ø 12 mm) | 14 | Fan |

Montaj adımları

Yöntem

Not

Hava soğutmalı motorların montaj adımları

Die Montageschritte 1, 13, 14, 15, und 16 sind nur bei luftgekühlten Motoren erforderlich.

1. Fanı ve ara mahfazayı motordan sökün.
2. Conta kapağını sökün.
3. Gerekirse motorun komple dengelenmesini dıştaki dengeleme diskleriyle gerçekleştirin.
4. Döner girişin rotorunu NDE motor mili ucuna vidalayın ve onu uygun momentle sıkın (taşı tutma için NDE motor mili ucundaki anahtar yüzeyini kullanın).
5. (Teslimat kapsamına dahil olmayan) statorun adaptörünü 6x M5 vidayla verici kapağına takın. Bu sırada adaptörü, sızıntı bağlantısı (yatay montajda) en derin noktada olacak şekilde yerleştirin.
6. Sızıntı ve kapatma havası için hortumları adaptöre bağlayın ve gerekirse aç parçalarını kullanın.
7. Döner girişin statorunun girişi için hortumu bağlayın ve gerekirse aç parçalarını kullanın.
8. Statoru adaptöre vidalayın.
9. Sızıntı için hortumları her zaman yamaçlarda (min. 15°) aşağıya doğru olarak döşeyin.
10. Giriş hortumunu da aşağıya doğru döşeyin.
11. Rotorun kolay çalışmasını elle kontrol edin.
12. Yapının basınç altındaki sızdırmazlığını kontrol edin.
13. Giriş ve sızıntı hortumlarının girintisini ara mahfazaya yerleştirin.
14. Ara mahfazayı girintisiyle hortumların üzerine itin ve motorlara vidalayın. Hortumları mekanik yüklerden koruyun.
15. Fanı ara mahfazaya vidalayın.
16. Girintiyle hortumların arasında kalan delikleri kapatın.



4.7.3

Takma notları

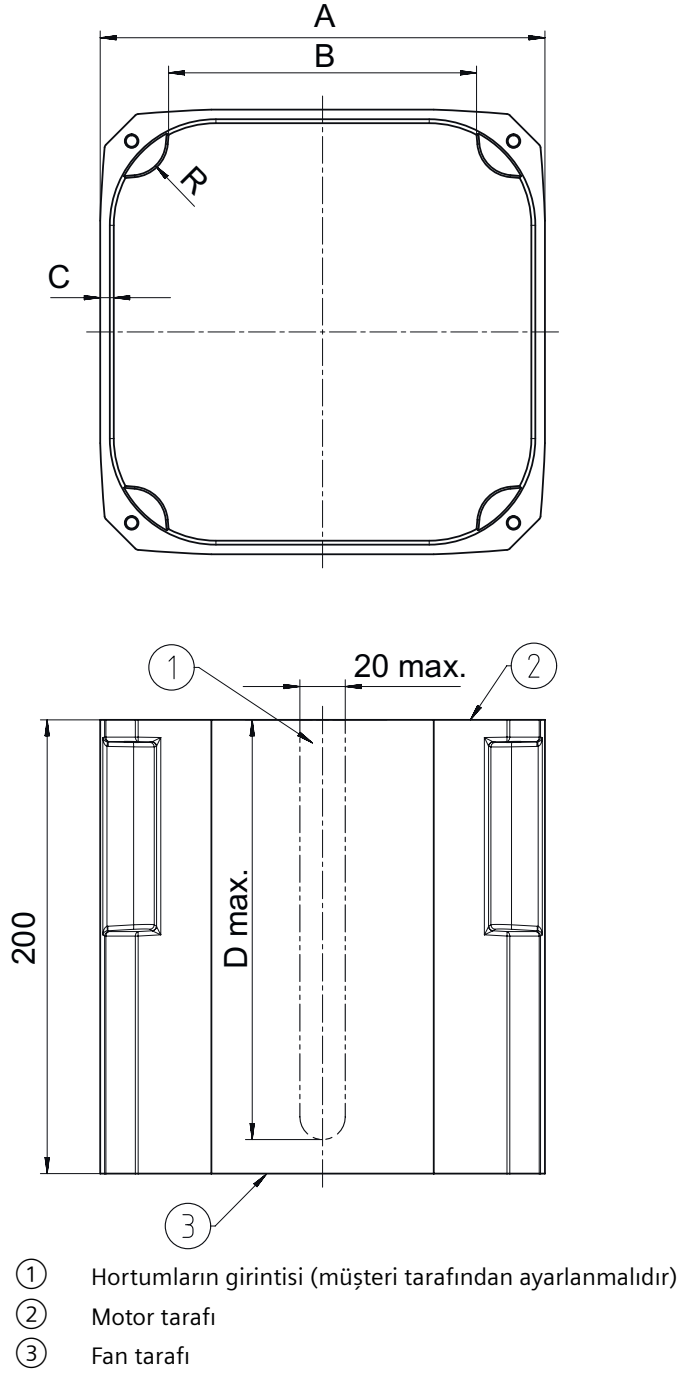
- Rotorla taşınan döner girişlerde ek çevirme sigortası takmayın
- Boruları asla doğrudan döner girişine vidalamayın.
- Döner girişle sabit boru bağlantısı arasında her zaman bir hortum hattı kullanın. Bunun için hortum hattını yay şeklinde ve burulmayacak şekilde döşeyin.
- Önce esnek hortumları rotorla taşınan döner girişe vidalayın. Sonra döner giriş söz konusu momentle mile vidalayın.

- Yanlış hortum uzunluklarından ve uygunsuz montaj malzemesinden kaynaklanan gerilimleri önleyin.
- Döner girişin takılı durumda kolayca çevrilebilmesi gerekir.
- Döner girişlerdeki talaş ve kıymıkları temizleyin.
- Bu sırada döner girişi, sızıntı bağlantısı en derin noktada olacak şekilde yatay olarak yerleştirin.
- Sızıntı hattını her zaman minimum 15° aşağıya doğru ve büyük çapla döşeyin.
- Sızıntı hattı sızıntı bağlantısından yüksekteyse ve salmastra açıksa, döner giriş ve bir ihtimal motor da su altında kalır. Motor arızalanabilir.
- Giriş hattını da azalacak şekilde döşeyin. Bu sayede, salmastra açıkken (örneğin alet değiştirme veya durma) soğutucu yağlama maddesi giriş hattına geri akar ve motor milinden ve sızıntı bağlantısından geçmez.
- Salmastraya herhangi bir parçacık veya talaş kaçmaması ve ona zarar vermemesi için, soğutucu yağlama maddesini filtreleyin.

Not**Döner girişi takma**

- Döner girişin montajı sırasında dişliyi NDE milin ucuna tam sızdırmaz şekilde vidalayın. Dışarıya soğutucu yağlama maddesi çıkmadığından emin olun.
-
- Döner girişin ve hortumların sızdırmazlığını düzenli olarak kontrol edin.

Hava soğutmalı motorlardaki ara mahfaza



Ara mahfazanın aralık ölçüleri

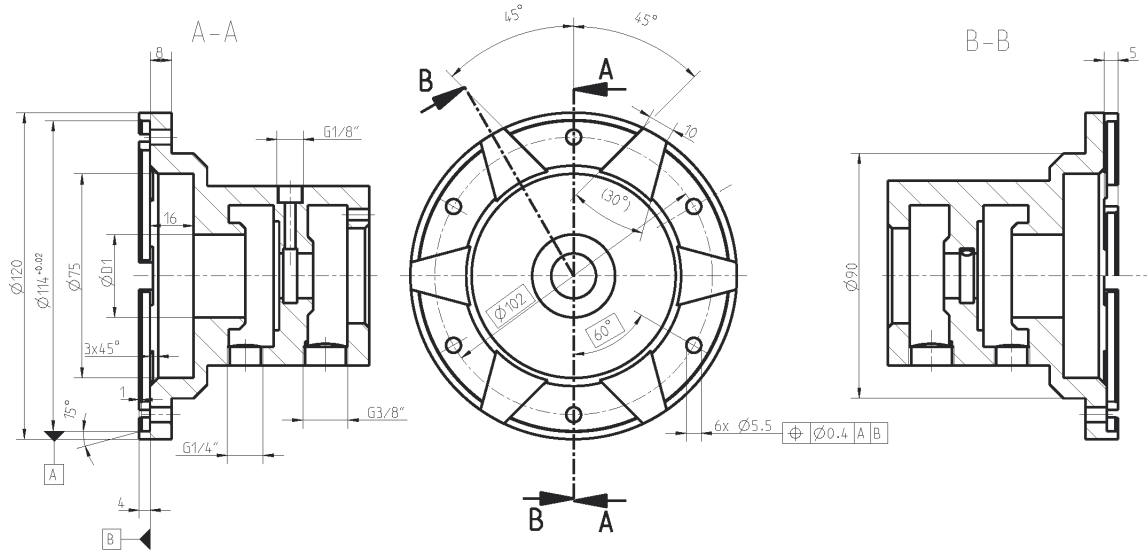
	AH 80	AH100
A	155	196
B	99	133
C	6	6
R	16	16
D	170	185

4.7.4 Yataksız, mahfazayla taşınan döner girişler için adaptör teklifi

Not

Üretici verilerine uyun

Döner girişi takmak için üreticinin belirlediği veri ve uyarılara uyun.



Resim 4-5 Yataksız, mahfazayla taşınan bir döner girişin statorunu almak için bir adaptör modeli örneği

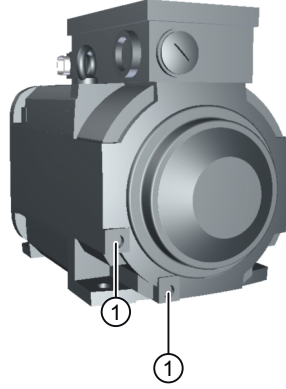
	1PH808.	1PH810.
Çap D1	Ø22,5H7	Ø30,5H7

5.1 Su soğutmasının mekanik bağlantısı

Soğutma suyu beslemesinin giriş ve çıkış delikleri, yatak levhasındaki çıkış tarafında bulunur.

Prosedür

1. Soğutma suyunun, soğutma suyu kurallarına uygun olmasını sağlayın. Bakın bölüm "Soğutma".
2. Yeterli miktar soğutma suyu bulunmasını sağlayın, bakın güç levhası.
3. Soğutma suyu hatlarını iç dişe vidalayın. Giriş ve çıkışı istediğiniz gibi bağlayabilirsiniz.



1 Su soğutma sistemi bağlantıları

4. İzin verilen maksimum 6 bar işletme basıncının aşılmadığından emin olunuz.

Böylece su soğutma sistemine bağlantı tamamlanmış olur.



5.2 Elektrik bağlantısı



Yalıtım folyosu söküldüğünde elektrik çarpması

Bağlantı kutusundaki yalıtım folyosu, kapağa karşı gerilim atlamasına karşı koruma sağlar.

- Bağlantı kutusundaki yalıtım folyosunu kesinlikle çıkartmayın.

DİKKAT**Trifaze akım beslemesine doğrudan bağlandığında motorun bozulması**

Trifaze akım beslemesine doğrudan bağlantı, motorun bozulmasına neden olur.

- Motorları ancak gerektiği şekilde yapılandırılmış olan konvertörlerle çalıştırın.

DİKKAT**Elektrostatik tehlike altındaki parçalarda hasar**

DRIVE-CLiQ arabiriminin, elektrostatik tehlike altındaki parçalarla (EGB) doğrudan teması vardır. Verici sistemleri ve sıcaklık sensörleri, elektrostatik tehlike altındaki parçalardır (EGB).

Bağlantılara elinizle veya elektrostatik olarak yüklü aletlerle dokunursanız, elektrostatik açıdan hassas bileşenler zarar görebilir.

- Bunun için, "Elektrostatik tehlike altındaki yapı elemanlarını (EGB) kullanma" bölümündeki bilgilere dikkatli bir şekilde uyun.

Not**EMU güvenlik koşullarına uyma**

Konvertör beslemeli alçak gerilim trifaze akım motorları olan sistem ve makinelerin EMU yönetmeliğinin güvenlik koşullarına uyması gerekir. Makine üreticisi, doğru kurulumdan sorumludur. Motorun sinyal ve besleme hatlarının yalıtılması gerekir. Konvertör üreticisinin EMU kurulum direktifi uygulanmalıdır. Siemens konvertörleri için bunları belge sipariş numarası 6FC5297-□AD30-0□P□ altında bulabilirsiniz.

5.2.1**Kablo girişi ve hat döşeme**

- Gereken bağlantı hatlarını, nominal akım şiddetine ve çevre sıcaklığı, yerleştirme türü vs. gibi tesise bağlı koşullara dikkat ederek IEC/EN 60364-5-52 ve IEC/EN 60204-1'e göre seçin.
- Sabit yerleştirilmiş kablo girişleri için EMU kablo bağlantıları kullanın.
- Blendajları EMU kablo bağlantıları üzerinden geniş yüzeyli olarak makinenin bağlantı kutusuna iletken şekilde bağlanan blendajlı hatlar kullanın. Hat yalıtımlarının amacına uygun bir biçimde bağlandığından emin olun.
- Bağlantı kutusunda açıkta olan bağlantı hatlarını, koruyucu iletken fazla uzunlukta döşenecek ve hat damarlarının izolasyonu zedelenmeyecek şekilde ayarlayın.
- Bağlantı uçlarını ancak izolasyon kablo çarığına, bağlantıya veya kablo ucu kovanına kadar uzanacak şekilde yalıtın.
- Kablo çarıklarının veya kablo ucu kovanlarının boyutunu sıkma tahtası bağlantılarının ölçülerine ve şebeke hattının çapına uyarlayın, gerekirse paralel bağlantı hatlarını kullanın.

- Bağlantı kutusunun veya fişin içinin temiz olması ve içinde hat artıkları ve nem bulunmaması gerekir.
- Elektrik bağlantılarının tüm vida bağlantılarını (bağlantı çubukları hariç, bağlantı panosu bağlantılarını) belirtilen sıkma torkuna göre sıkın.

Tablo 5-1 Sıkma torkları

Dişli çapı	M4	M5	M6	M8	M10
Nm olarak sıkma torku	0,8 ... 1,2	1,8 ... 2,5	2,7 ... 4	5,5 ... 8	9 ... 13

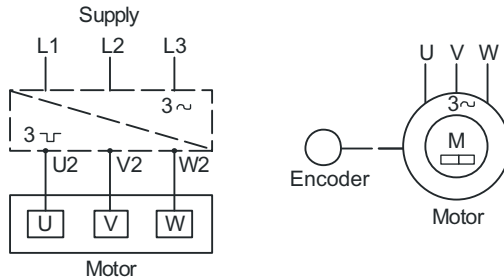
- Bağlama veya gerekirse iş bağlantı hatlarını uygulama sırasında 5,5 mm minimum hava mesafesine uymaya dikkat edilmelidir.
- Ayrık hat uçlarından kaçının.
- Kullanılmayan kablo girişlerini kapatın ve kilitleme elemanlarını sıkı ve sızdırmaz şekilde vidalayın.
- Koruma türüne uyulması için, bağlantı kutusunun ve fişlerin contalarını ve conta yüzeylerini kontrol edin.
- Bağlantı hatlarını kıvrıma, çekme ve itme yükünü azaltma ve bükülme koruması ile donatın. Fişler üzerinde sürekli kuvvetlerin olması yasaktır.
- Fiş bağlantısının kodlama somununun kovan fişlerine tam hizalanacak şekilde yerleştirilmesi gerekir. Başlık somununun sonuna kadar elle sıkılması gerekir.
- Fişleri sadece gerilimsiz durumda takın veya çekin.
- Bağlantı kutusunda yalıtım folyosunun bulunması gerekir.

Güç ve sinyal hatlarının akım yüklenebilirliği

PVC/PUR yalıtımlı bakır hatların akım yüklenebilirliği, EN 60204-1 altında belirtilmiştir.

5.2.2 Devre şeması

Devre şeması, kablo bağlantısı ve motor sargısı bağlantısı bilgileri içeriyor. Devre şeması, bağlantı kutusunun kapağına takılıdır.



Resim 5-1 Devre şeması

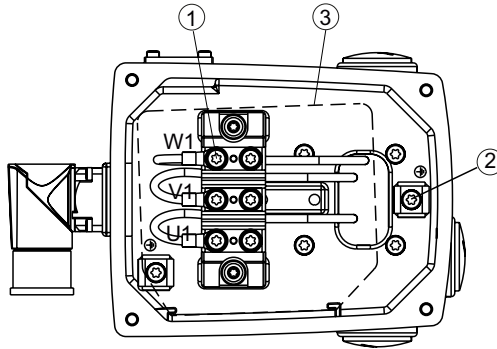
DİKKAT**Hat çıkış yönünü yanlış değiştirmeden kaynaklanan hat hasarları**

Hat çıkış yönünü amacına uygun olmayacak şekilde değiştirirseniz, bağlantı hatlarına zarar verirsiniz.

- Hat çıkış tertibatını değiştirmek, garanti haklarının kaybolmasına neden olur.

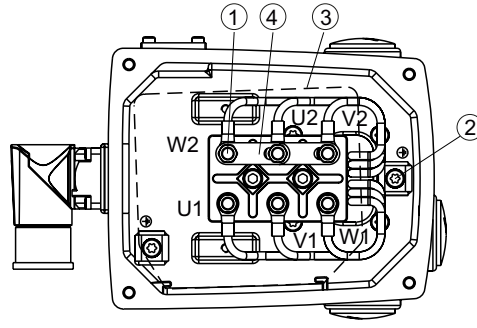
5.2.3**Terminal kutusu**

- Bağlantı kutusundaki bağlantı yerleşimini, "Bağlantı kutusu 3 kutuplu" veya "Bağlantı kutusu 6 kutuplu" resimlerindeki gibi gerçekleştirin
- Koruyucu iletkeni bağlayın
- DIN 46234'e uygun kablo çarıkları kullanın
- Yalıtım şeritlerini çıkartmayın
- Bağlantı kutusunun kapağını tekrar vidalayın (sıkma torku 5 Nm)



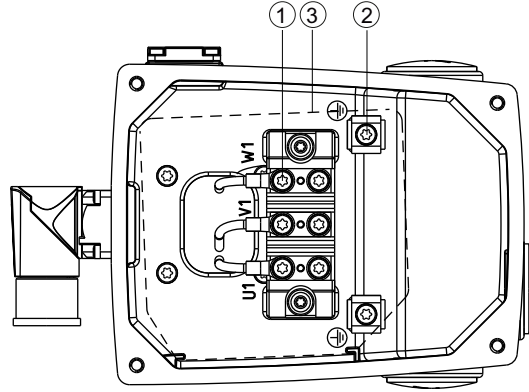
- ① Bağlantı şeması M5
- ② Topraklama cıvatası M5
- ③ Yalıtım şeritleri

Resim 5-2 1PH808 için bağlantı kutusu gk803, 3 kutuplu



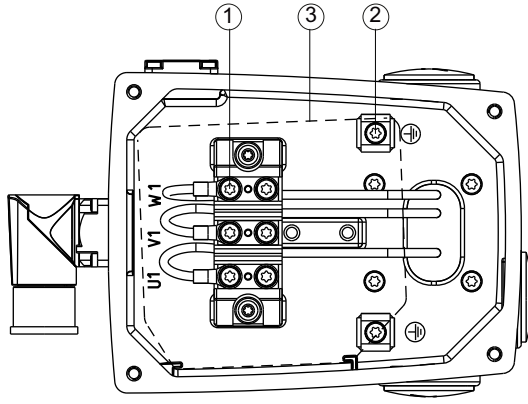
- ① Bağlantı sıvatası M5
- ② Topraklama cıvatası M5
- ③ Yalıtım şeritleri
- ④ Köprü

Resim 5-3 1PH808 için bağlantı kutusu gk806, 6 kutuplu (yıldız-üçgen değiştirilebilir)



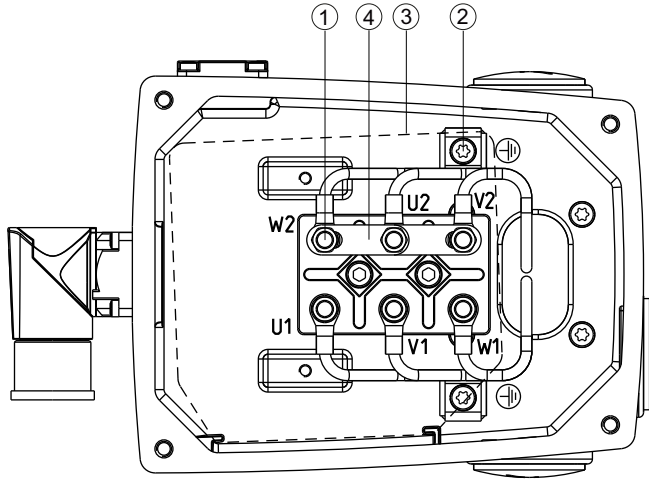
- ① Bağlantı şeması M5
- ② Topraklama cıvatası M5
- ③ Yalıtım şeritleri

Resim 5-4 1PH810 için bağlantı kutusu gk813, 3 kutuplu



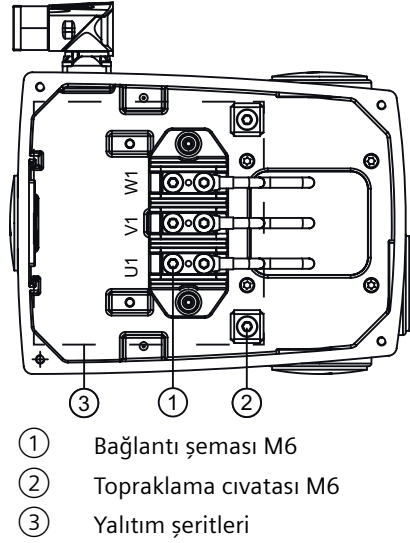
- ① Bağlantı şeması M5
- ② Topraklama cıvatası M5
- ③ Yalıtım şeritleri

Resim 5-5 1PH810 için bağlantı kutusu gk823, 3 kutuplu



- ① Bağlantı şeması M5
- ② Topraklama cıvatası M5
- ③ Yalıtım şeritleri
- ④ Köprü

Resim 5-6 1PH810 için bağlantı kutusu gk826, 6 kutuplu (yıldız-üçgen değiştirilebilir)



Resim 5-7 Bağlantı kutusu gk803 (1PH808), gk823 (1PH810), 3 kutuplu, hat girişi DE (tahrik ucu)

Not

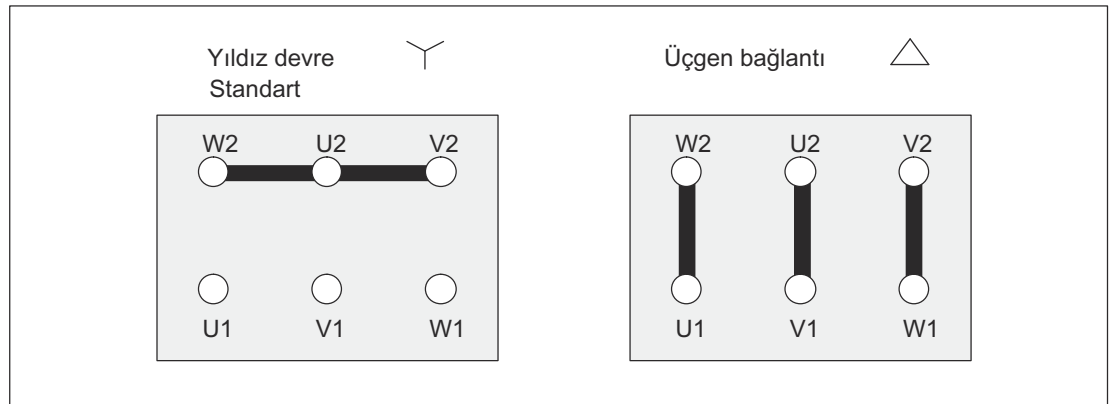
Hat çıkış yönü DE

DE hat çıkış yönüyle motorun sipariş numarasının 15. basamağında bir "D" vardır.

Yıldız/üçgen devresi

Yıldız/üçgen devresi, harici bir koruma şalteri veya gk806 bağlantı kutusunda 1PH808 ve gk826 bağlantı kutusunda 1PH810 için sabit ayar olarak ayarlanır.

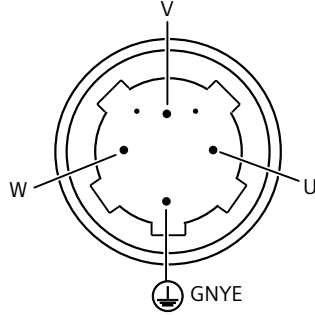
Standart ayar: Şalter köprülerinden yıldız devre



Resim 5-8 Bağlantı kutusunda sabit yıldız/üçgen devresi

5.2.4 Güç soketi

- M40 fişini kullanın.
- Fiş yerleşimini, "Güç fişi" resminde gösterildiği şekilde gerçekleştirin. Koruyucu iletkeni bağlayın.



Resim 5-9 Güç fişi M40 (fiş pimlerindeki görünüm)

5.2.5 Elektrik bağlantısı için veriler

Tablo 5-2 Motorlar 1PH8, aks yüksekliği 80

Terminal kutusu tipi	Hat girişi (güç)	Hat girişi (harici sinyaller)	Hattın dış çapı, maks. ²⁾	Ana terminal adedi	Bağlantı başına kesit, maks.	Bağlantı başına akım, maks. ³⁾
gk803	1 x M25 x 1,5	1 x M16 x 1,5 ¹⁾	20 mm	Fazlar: 3 x M5 Topraklama: 2 x M5	1 x 10 mm ²	52 A
gk806	1 x M25 x 1,5	1 x M16 x 1,5 ¹⁾	20 mm	Fazlar: 6 x M5 Topraklama: 2 x M5	1 x 10 mm ²	52 A

¹⁾ Dişli M16 x 1,5, sinyal bağlantısına 90° ile sıralanmıştır; dişliler sadece A12, A25 ve (vericisiz) verici modeli A seçeneklerinde kullanılabilir

²⁾ Metrik kablo bağlantısının modeline bağlıdır

³⁾ EN 60204-1 ve IEC 60364-5-52'ye referansla akım yüklenebilirliği, döşeme türü E

Tablo 5-3 Motorlar 1PH8, aks yüksekliği 100

Terminal kutusu tipi	Hat girişi (güç)	Hat girişi (harici sinyaller)	Hattın dış çapı, maks. ²⁾	Ana terminal adedi	Bağlantı başına kesit, maks.	Bağlantı başına akım, maks. ³⁾
gk813	1 x M32 x 1,5	1 x M16 x 1,5 ¹⁾	24,2 mm	Fazlar: 3 x M5 Topraklama: 2 x M5	1 x 16 mm ²	70 A
gk823	1 x M32 x 1,5	1 x M16 x 1,5 ¹⁾	24,2 mm	Fazlar: 3 x M5 Topraklama: 2 x M5	1 x 16 mm ²	70 A
gk826	1 x M32 x 1,5	1 x M16 x 1,5 ¹⁾	24,2 mm	Fazlar: 6 x M5 Topraklama: 2 x M5	1 x 10 mm ²	52 A

¹⁾ Dişli M16 x 1,5, sinyal bağlantısına 90° ile sıralanmıştır; dişliler sadece A12, A25 ve (vericisiz) verici modeli A seçeneklerinde kullanılabilir

²⁾ Metrik kablo bağlantısının modeline bağlıdır

³⁾ EN 60204-1 ve IEC 60364-5-52'ye referansla akım yüklenebilirliği, döşeme türü E

5.2.6 DRIVE-CLiQ arabirimli motorlar

DİKKAT

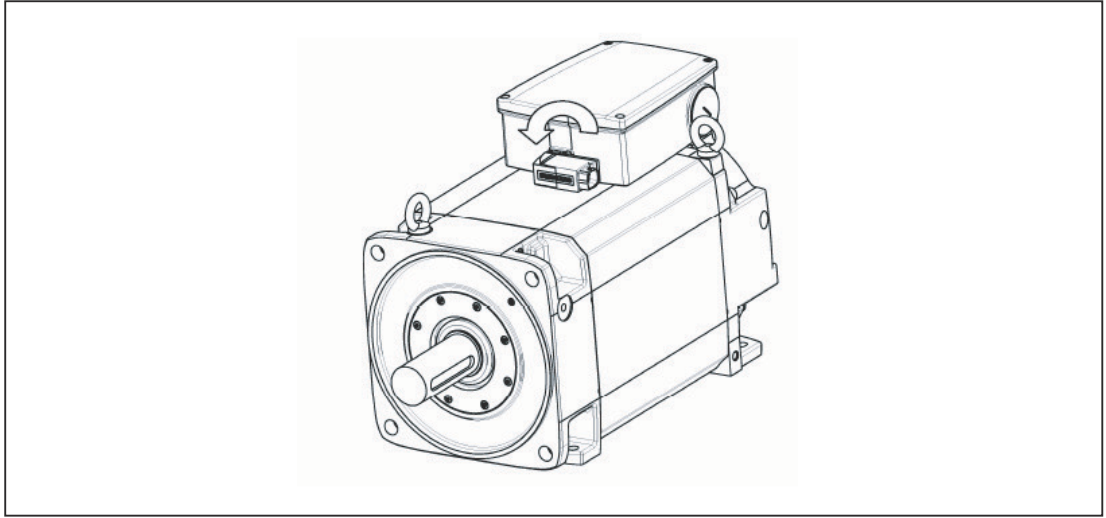
Elektrostatik tehlike altındaki parçalarda hasar

DRIVE-CLiQ arabiriminin, elektrostatik tehlike altındaki parçalarla (EGB) doğrudan teması vardır. Verici sistemleri ve sıcaklık sensörleri, elektrostatik tehlike altındaki parçalardır (EGB).

Bağlantılara elinizle veya elektrostatik olarak yüklü aletlerle dokunursanız, elektrostatik açıdan hassas bileşenler zarar görebilir.

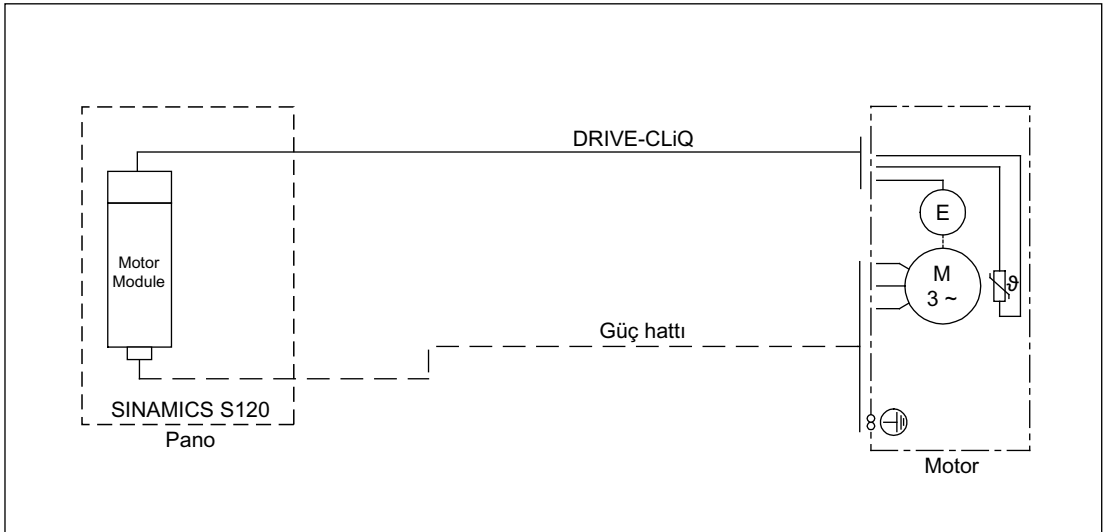
- Bunun için, "Elektrostatik tehlike altındaki yapı elemanlarını (EGB) kullanma" bölümündeki bilgilere dikkatli bir şekilde uyun.

SINAMICS tahrik sisteminin motorları, verici ve sıcaklık değerlendirmesini ve elektronik bir tip levhasını içeren entegre bir Sensor Module ile donatılmıştır. Sinyal fişi yerine bu Sensor Module'a takılıdır ve RJ45plus tipi 10 kutuplu bir kovanı vardır. BU kovana DRIVE-CLiQ arabirimi denir. Bağlantı yerleşimi, motorun dahili vericisinden bağımsızdır. Sensor Module yakl. 180° döner. Tipik çevirme momenti 4 ile 8 Nm arasındadır. Sensor Module ancak elle çevrilebilir. Pense, çekiç vs. kullanılması yasaktır.



Resim 5-10 DRIVE-CLiQ arabirimli motor (örnek)

Motorla Motor Module arasındaki sinyal bağlantısı, MOTION-CONNECT tipi bir DRIVE-CLiQ hattıyla gerçekleştirilir. MOTION-CONNECT DRIVE-CLiQ hattının fişinin, yerleşmeli yaylar yerlerine oturacak şekilde takılması gerekir.

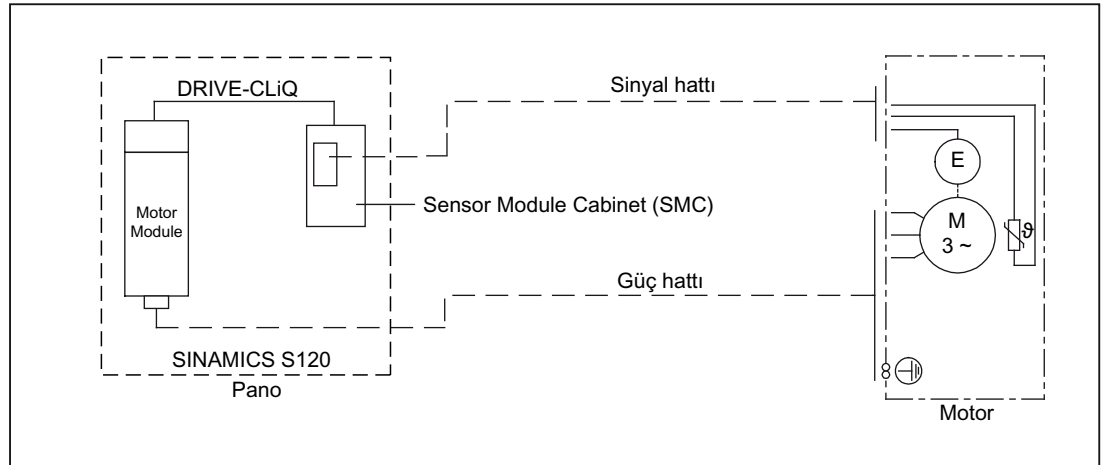


Resim 5-11 DRIVE-CLiQ ile verici bağlantısı

5.2.7 DRIVE-CLiQ arabirimi olmayan motorlar

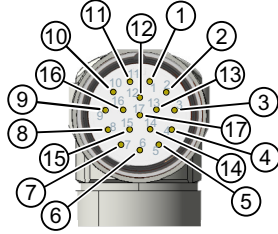
Motorun bir DRIVE-CLiQ arabirimi yoksa, devir sayısı vericisi ve sıcaklık sensörü bir sinyal fişinden bağlanır.

DRIVE-CLiQ'suz motorları SINAMICS S120 ile çalıştırmak için bir kabine takılı bir Sensor Module (SMC) veya harici bir Sensor Module (SME) gerekir. Motor, SMC'ye veya SME'ye sinyal kabloyla bağlanır. SMC veya SME, bir MOTION-CONNECT DRIVE-CLiQ kabloyla Motor Module'a bağlanır.



Resim 5-12 DRIVE-CLiQ'suz verici arabirimi

Sinyal fişi malzeme cinsi

Bağlantı yerleşimi, 12 kutuplu sinyal fişi	Bağlantı yerleşimi, 17 kutuplu sinyal fişi			
				
Artış verici HTL 2048 S/R HTL 1024 S/R	Artış verici IC 2048 S/R	Artış verici IN 256 S/R IN 512 S/R	Mutlak verici AM 2048 S/R	
1 = B*	1 = A	1 = A	1 = A	
2 = +1R1	2 = A*	2 = A*	2 = A*	
3 = R	3 = R	3 = R	3 = Daten	
4 = R*	4 = D*	4 = bağlı değil	4 = bağlı değil	
5 = A	5 = C	5 = bağlı değil	5 = Vuruş	
6 = A*	6 = C*	6 = bağlı değil	6 = bağlı değil	
7 = CTRL	7 = M vericisi	7 = M vericisi	7 = M vericisi	
8 = B	8 = +1R1	8 = +1R1	8 = +1R1	
9 = bağlı değil	9 = -1R2	9 = -1R2	9 = -1R2	
10 = M vericisi	10 = P vericisi	10 = P vericisi	10 = P vericisi	
11 = -1R2	11 = B	11 = B	11 = B	
12 = P vericisi	12 = B*	12 = B*	12 = B*	

Bağlantı yerleşimi, 12 kutuplu sinyal fişi	Bağlantı yerleşimi, 17 kutuplu sinyal fişi		
	13 = R*	13 = R*	13 = Veriler*
	14 = D	14 = bağlı değil	14 = Vuruş*
	15 = M sensörü	15 = M sensörü	15 = M sensörü
	16 = P sensörü	16 = P sensörü	16 = P sensörü
	17 = bağlı değil	17 = bağlı değil	17 = bağlı değil

Açı fişi uygun bir kovanla çevrilebilir. Fiş bağlantılarının hasar görmesini önlemek için, kovanın tamamen emniyete alınması gerekir.

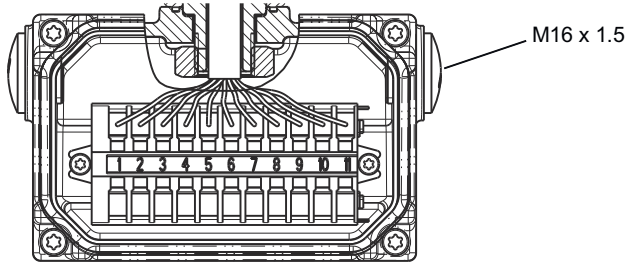
5.2.8 HTL artış vericiyi bağlama

Ek bağlantı kutusu üzerinden bağlantı bloklu verici bağlantısı

Asenkron modeldeki motorlar, ek bağlantı kutusuyla donatılabilir. Böylece aşağıdaki HTL artış vericileri, SINAMICS G'deki işletme için bir bağlantı blokundan bağlayabilirsiniz:

- HTL1024 S/R ve
- HTL2048 S/R

Ek bağlantı kutusu aşağıdaki resimde gösterilmiştir.



Resim 5-13 Ek bağlantı kutusu üzerinden verici bağlantısı

HTL artış vericiyi bağlamak için aşağıdaki sinyal yerleşimi geçerlidir:

Uç	Sinyal düzeni
1	-1R2
2	+1R1
3	B*
4	R
5	R*
6	A
7	A*
8	CTRL
9	B

Uç	Sinyal düzeni
10	M kodlayıcısı
11	P kodlayıcısı

Not**Ek olarak verilen sensörler**

Bağlantı kutusundaki aşağıdaki ek sensörleri "Bağlantı kutusu" bölümüne göre bağlayın:

- Yedek olarak sıcaklık sensörü veya
- Uyarı ve kapatma için soğuk iletken zinciri

Not**Sıcaklık sensörü**

Sıcaklık sensörünün tipi, güç levhasında belirtilmiştir.

5.2.9**Sıcaklık sensörünün (sezici) bağlanması**

Motorun motor sargısında bulunan sıcaklık sensörü, devir sayısı verici sinyaliyle birlikte sinyal fişine yerleştirilmiştir.

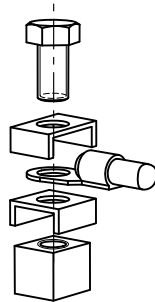
DİKKAT**Motorda termik hasar**

Motor aşırı ısındığında sargılar ve yataklar parçalanabilir.

- Sıcaklık sensörü değerlendirildiğinden emin olun.

5.2.10**Topraklama iletkenini bağlantı kutusuna bağlama**

Makinenin toprak hattı kesitinin, örneğin IEC/EN 60204-1 uyarınca ayarlama kurallarına uygun olması gerekir. Toprak hattını bağlantı kutusuna bağlayın.



Resim 5-14 Topraklama iletkenini bağlayın

Potansiyel dengeleme

Motorun yapısı, bağlantı kutusu mahfazasındaki topraklama bağlantısıyla motor gövdesinin arasındaki dahili potansiyel dengelemesi öngörüyor. Cıvata kafalarının altındaki temas yerleri parlaktır ve korozyona karşı korunmuştur.

Normal kapak sabitleme cıvataları, bağlantı kutusu kapağı ile bağlantı kutusu gövdesi arasındaki potansiyel dengelemesi için yeterlidir.

5.2.11 1PH808 için harici fanı bağlama

Fan bağlantısı bir M23 güç fişiyle gerçekleştirilmiştir.

Tablo 5-4 1PH808 için harici fanın tek fazlı bağlantı değerleri

Hava akımının yönü	Maks. elektrik sarfıyatı		
	230 V / 50 Hz ($\pm\%10$) A olarak	230 V / 60 Hz ($\pm\%10$) A olarak	265 V / 60 Hz ($\pm\%10$) A olarak
A tarafı → B tarafı	0,21	0,17	0,21
B tarafı → A tarafı	0,35	0,265	0,35

Tablo 5-5 1PH808 için harici fanın iki fazlı bağlantı değerleri (seçenek L77)

Hava akımının yönü	Maks. elektrik sarfıyatı	
	400 V / 50 Hz ($\pm\%10$) A olarak	400 V / 60 Hz ($\pm\%10$) A olarak
A tarafı → B tarafı	0,14	0,11
B tarafı → A tarafı	0,22	0,17

Aşağıdaki bağlantı uyarılarına uyun:

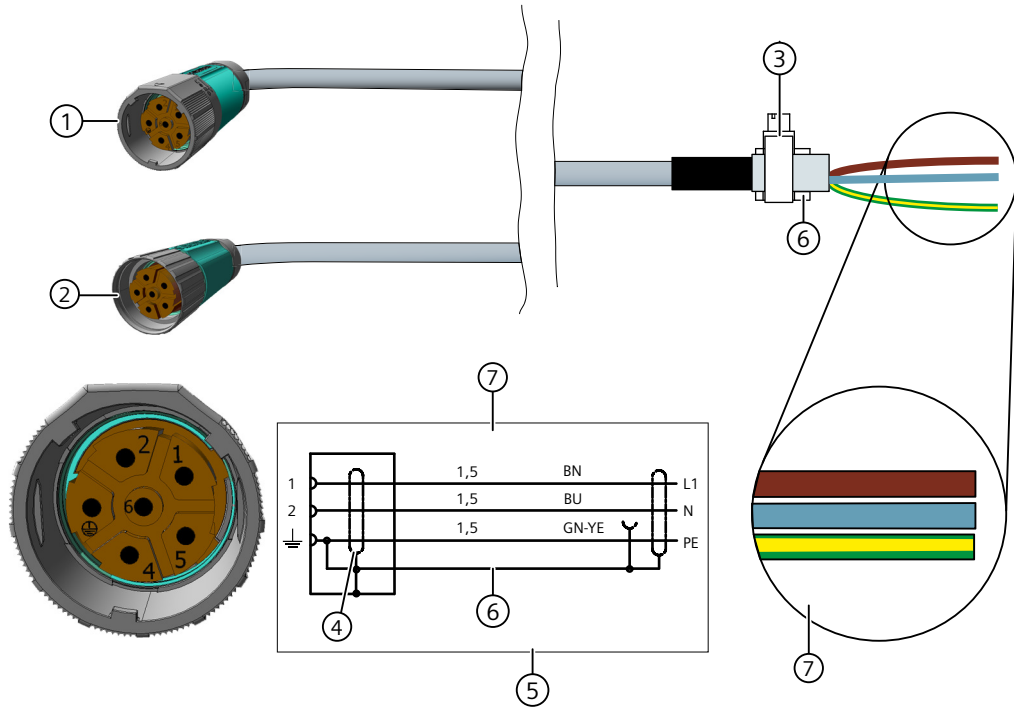
- "Harici fanın işletme kılavuzu" ekindeki bilgilere uyun.
- Sadece öngörülen kurulum talimatları uyarınca ilgili gerilim, akım, izolasyon malzemesi ve yüklenilebilirlik değerlerine uygun olan kabloları kullanın.
- Cihazı bağlamadan önce, şebeke geriliminin cihaz gerilimine uygun olduğundan emin olun.

- Fan tip plakası verileri ile bağlantı verilerinin örtüşüp örtüşmediğini kontrol edin.
- Bağlantı hatları izin verilmeyen yüklere maruz bırakılmamalıdır.

DİKKAT**Yanlış kullanımdan kaynaklanan fan hasarı**

Yanlış kullanıldığında fan zarar görebilir.

- Fanı bir blokaj korumasıyla amacına uygun olmayan kullanımdan koruyun. Bunun için, tüm kutuplu kapatma seçeneği olan uygun bir motor koruma şalterini kullanın. Fan bu koruma şalteriyle kullanılmalıdır.
- Bir kilitleme şalteriyle, fan dururken ana motoru çalıştırmak engellenmelidir.

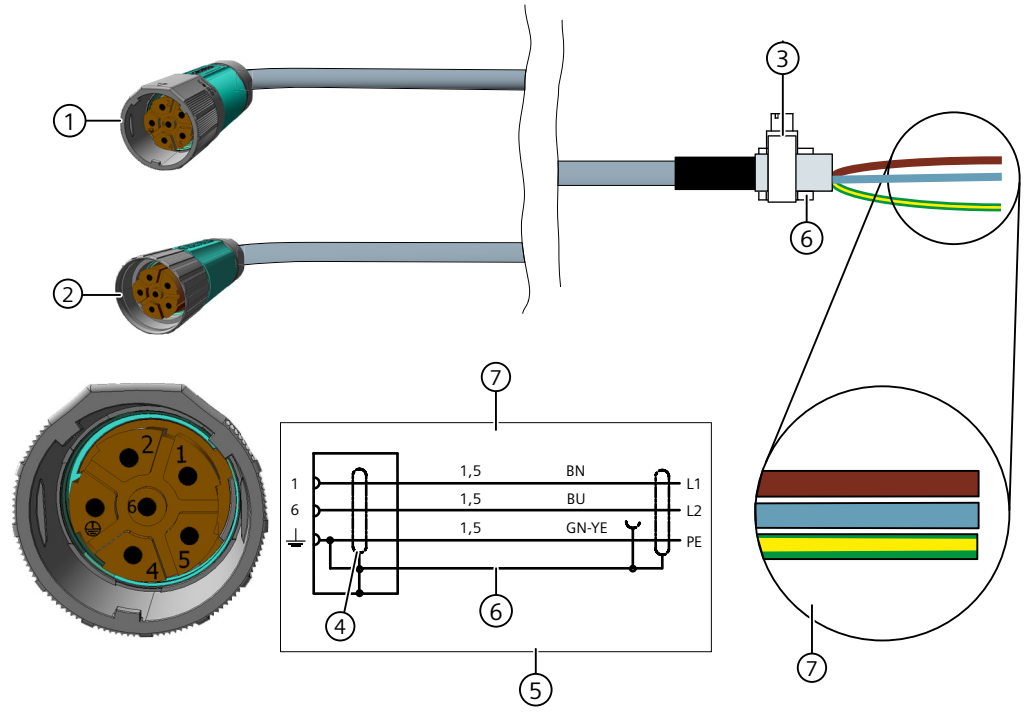


- 1 Fiş boyutu M23 (tam dişliyle)
- 2 Fiş SPEED CONNECT M23
- 3 Hat yalıtımı bağlantısı
- 4 PİM ataması
- 5 Devre şeması
- 6 Kablo yalıtımı
- 7 Tel adı:

L1, N = güç hattı, 1,5 mm²

PE = koruyucu iletken

Resim 5-15 Tek fazlı bağlantı harici fan



- 1 Fiş boyutu M23 (tam dişliyle)
- 2 Fiş SPEED CONNECT M23
- 3 Hat yalıtımı bağlantısı
- 4 PİM ataması
- 5 Devre şeması
- 6 Kablo yalıtımı
- 7 Tel adı:

L1, L2 = güç hattı, 1,5 mm²

PE = koruyucu iletken

Resim 5-16 İki fazlı bağlantı harici fan (seçenek L77)

5.2.12 1PH810 için harici fanı bağlama

Fan bağlantısı, fan bağlantı kutusundadır.

Motor güç fişiyle sipariş edildiğinde, harici fan bağlantısı güç fişi M23 ile donatılmıştır (bakın bölüm "1PH808 için harici fanı bağlama").

Tablo 5-6 1PH810 için harici fanın bağlantı değerleri

Hava akımının yönü	Maks. elektrik sarfıyatı		
	400 V / 50 Hz ($\pm\%10$) A olarak	400 V / 60 Hz ($\pm\%10$) A olarak	480 V / 60 Hz ($\pm\%10$) A olarak
A tarafı → B tarafı	0,10	0,08	0,11
B tarafı → A tarafı	0,08	0,07	0,11

Aşağıdaki bağlantı uyarılarına uyun:

- "Harici fanın işletme kılavuzu" ekindeki bilgilere uyun.
- Sadece öngörülen kurulum talimatları uyarınca ilgili gerilim, akım, izolasyon malzemesi ve yüklenilebilirlik değerlerine uygun olan kabloları kullanın.
- Sadece mıknatıslı olmayan malzemelerden (plastik) oluşan parçaları kullanın.
- Cihazı bağlamadan önce, şebeke geriliminin cihaz gerilimine uygun olduğundan emin olun.
- Fan tip plakası verileri ile bağlantı verilerinin örtüşüp örtüşmediğini kontrol edin.
- Bağlantı kutusunu açın ve (teslimat kapsamına dahil olmayan) kabloları bağlantı kutusuna uzatın.
- Bağlantı hatları izin verilmeyen yüklere maruz bırakılmamalıdır.

- Topraklama hattını (PE) bağlayınız.
- Diğer kabloları söz konusu bağlantıya bağlayın (bakın bağlantı resimleri).

DİKKAT**Nemden kaynaklanan fan hasarları**

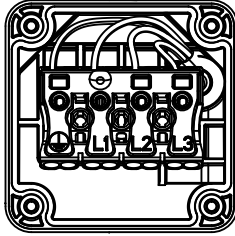
Örneğin hatlar boyundan bağlantı kutusuna su girdiğinde, fan arızalanabilir.

- Bağlantı kutusunda uygun kablolar ve kablo bağlantıları kullanın.
- Bağlantı kutusunun kapağının doğru yerleştirilmiş ve tam kapalı olmasını sağlayın.

DİKKAT**Yanlış kullanımdan kaynaklanan fan hasarı**

Yanlış kullanıldığında fan zarar görebilir.

- Fanı bir blokaj korumasıyla amacına uygun olmayan kullanımdan koruyun. Bunun için, tüm kutuplu kapatma seçeneği olan uygun bir motor koruma şalterini kullanın. Fan bu koruma şalteriyle kullanılmalıdır.
- Bir kilitleme şalteriyle, fan dururken ana motoru çalıştırmak engellenmelidir.



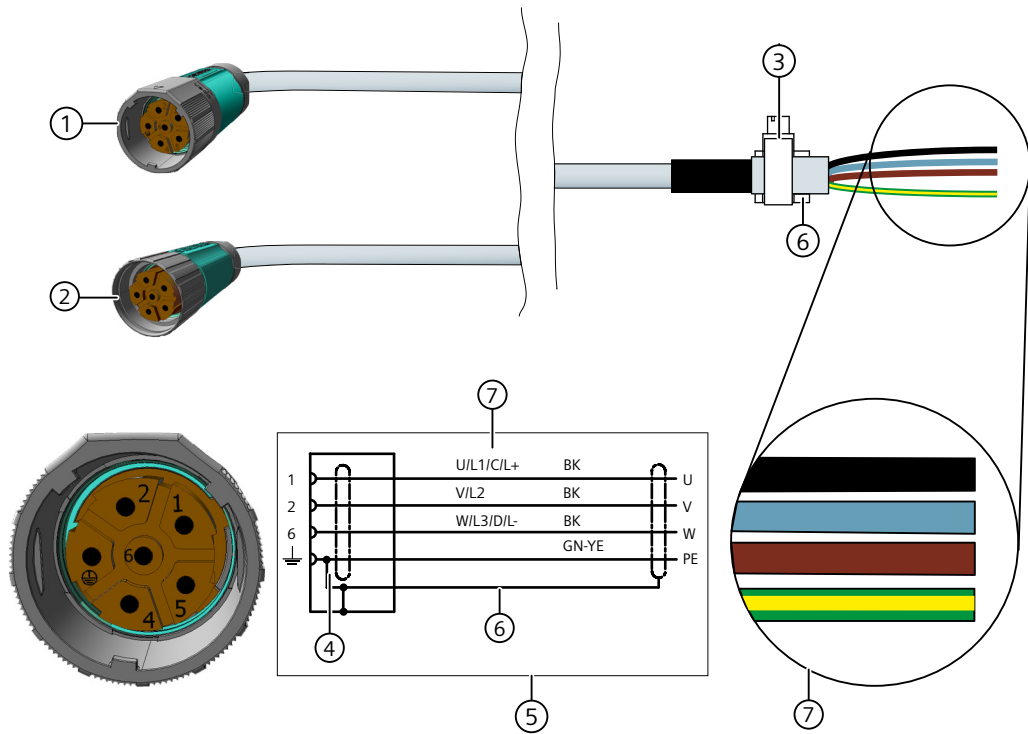
L1 Siyah

L2 Mavi

L3 Kahverengi

PE Yeşil/sarı

Resim 5-17 Bağlantı kutusundaki harici fanın bağlantısı



- ① Fiş boyutu M23 (tam dişliyle)
- ② Fiş SPEED CONNECT M23
- ③ Hat yalıtımı bağlantısı
- ④ PİM ataması
- ⑤ Kablo yalıtımı
- ⑥ Devre şeması
- ⑦ Tel adı:
U, V, W = güç hattı, 1,5 mm², her hat ekstra yalıtımlıdır
PE = koruyucu iletken

Resim 5-18 Üç fazlı bağlantı harici fan

5.2.13 Bir konvertöre bağlantı

Hatları seçme ve bağlama

- Motoru bir konvertöre bağlamak için MOTION-CONNECT tipi hatları veya yalıtımlı bağlantı hatlarını kullanın.

Not

Olabildiğince çok sayıda şeritten oluşması istenen kablo blendajının yüksek bir elektrik iletkenliğine sahip olması gerekir. Bakır ve alüminyumdan örülmüş blendajlar uygundur.

- Blendajı her iki taraftan motor ve konvertöre bağlayın.
- Blendajsız kablo sonlarını mümkün olduğunca kısa tutunuz.
- Yüksek frekanslı akımların iyi uzaklaştırılması için bağlantıyı geniş yüzeyli olarak uygulayın. Konvertörde ve motorda 360° teması olarak, hat girişlerinde örneğin EMU vida bağlantıları kullanın.

5.2.14 Durdurma frenini bağlama (seçenek)

Durdurma freninin (seçenek) elektrik bağlantısı, "Durdurma freni işletme kılavuzu" ekinde tarif edilmiştir.

Ayrıca bakınız

Durdurma freninin işletme kılavuzu (Sayfa 132)

5.2.15 Kapatma havası bağlantısı (seçenek Q12)

Alet makinelerinde ve aktarma makinelerinde genellikle yağlı, yavaş akan ve/veya tahriş edici soğutucu yağlama maddeleri kullanılır. Çok yavaş akan sıvılarla yapılan kritik uygulamalarda normalde (EN 60034-5/IEC 60034-5 uyarınca) suya karşı koruma türü tek başına yeterli değildir. Bu durumlarda, 1PH8 motorlarını Q12 seçeneğiyle kapatma havası bağlantısına bağlayabilirsiniz. Kapatma havası bağlantısını, bağlantı kutusu veya güç fişiyle bağlantılı olarak gerçekleştirebilirsiniz.

Not

Yavaş akan yağ ve sıvılara karşı daha iyi koruma

Kapatma havasıyla, suya karşı IP koruma türünü artırmazsınız. Ancak yavaş akan yağ ve sıvılara karşı daha iyi bir koruma sağlarlar.

Not

Bu seçeneğin sadece ek yağlamasız motorlarda kullanılmasına izin verilir.

Not

"Premium performans" yatak modeli için basıncı artırın

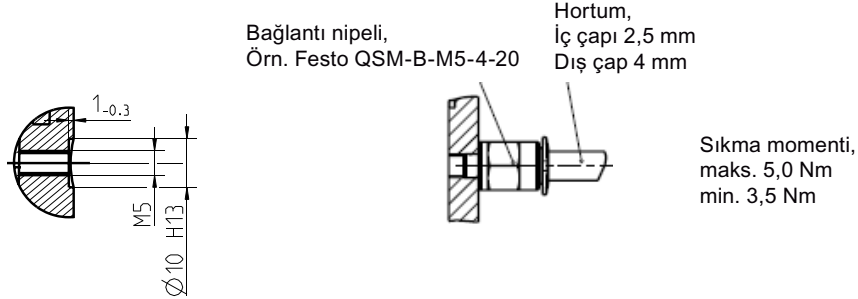
Yatak modeli "Premium Performans" için bağlantı basıncını min. $2,0 \times 10^5$ Pa ile maks. 5×10^5 Pa arasına artırmanız gerekir.

Şartlandırma: A Mil contasız ana tahrikler

min. hava girişi sıcaklığı (°C)	Ortam sıcaklığı
maks. hava girişi sıcaklığı (°C)	40
maks. kalan su oranı (g/m ³)	0,12
maks. artık yağ oranı (g/m ³)	0,01
maks. kalan toz (mg/m ³)	0,1
min. bağlantı basıncı (Pa)	2,0 x 10 ⁵
maksimum bağlantı basıncı (Pa)	3 x 10 ⁵
İçi boş mil vericideki parçacık boyu (µm)	< 8
Optik vericideki parçacık boyu (µm)	< 3

Şartlandırma: B Mil contalı ana tahrikler

min. hava girişi sıcaklığı (°C)	Ortam sıcaklığı
maks. hava girişi sıcaklığı (°C)	40
maks. kalan su oranı (g/m ³)	0,12
maks. artık yağ oranı (g/m ³)	0,01
maks. kalan toz (mg/m ³)	0,1
min. bağlantı basıncı (Pa)	0,05 x 10 ⁵
maksimum bağlantı basıncı (Pa)	0,1 x 10 ⁵
İçi boş mil vericideki parçacık boyu (µm)	< 8
Optik vericideki parçacık boyu (µm)	< 3



Bağlantı deliği

Montaj örneği

Resim 5-19 Kapatma havası bağlantısı (seçenek Q12)

gereken kapatma havası hacmi

Hacim (Nm ³ /saat) (Nm = Standart metreküp)	yakl. 2,3 (2 barda)
--	---------------------

Not

Hacim bilgisi, belirtilen minimum bağlantı basıncı için geçerlidir. Daha yüksek bağlantı basınçlarında hacim akışı, motorun mevcut akım direncine göre artar.

Devreye alma

6.1 Çalıştırmayla ilgili güvenlik uyarıları



İKAZ

Yetersiz olarak topraklı besleme ağlarına bağlantı sırasındaki tehlikeli gerilimden kaynaklanan ölüm tehlikesi vardır

Motorun yetersiz şekilde topraklanmış besleme ağlarına bağlantısı hata durumunda ölüm, ağır yaralanmalara ve/veya motor hasarına neden olabilir.

- Tahrik sisteminin parçası olarak, motorları yıldız noktası topraklı TN- ve TT şebekelerine veya bilgişlem şebekelerine bağlayın.
- Cihazları ve motorları, hatalı akım (FI) koruma tertibatları (RCD) olan bir elektrik şebekesine bağlamadan önce, SINAMICS cihazlarının ve motorların, EN 61800-5-1 uyarınca FI koruma tertibatıyla uyumluluğunu sağlayın.
- Motor yalıtımına aşırı yük binmemesi için, dış iletkenleri topraklı şebekelerde, örneğin TT şebekelerde şebekeyle tahrik sisteminin arasına yıldız noktası topraklı bir ayırma transformatörünü (ikincil taraf) bağlayın.
- Bilgişlem ağlarındaki kullanımda, bir denetleme tertibatının aktif bir parçayla toprak arasındaki ilk hatayı bildirmesi gerekir. Bu hatayı hemen giderin.



İKAZ

İzolasyon hasar gördüğünde yüksek gerilim kontrolünden kaynaklanan ölüm tehlikesi vardır

Motordaki bir yüksek gerilim kontrolü, motorun izolasyonuna zarar verebilir. Gerilim taşıyan parçalara dokunduğunuzda elektrik çarpabilir. Ayrıca elektronik bileşenler de bozulabilir. Etkilenen bileşenler örneğin sıcaklık sensörleri veya vericilerdir.

- Motordaki bir yüksek gerilim kontrolünden kaçının.



İKAZ

Dönen çıkış elemanlarından ve dışarı fırlatılan gevşek parçalardan kaynaklanan ölüm tehlikesi vardır

Dönen çıkış elemanları ve dışarı fırlatılan poyra yayları, motor çalışırken ağır yaralanmalara neden olabilir.

- Gevşek poyra yaylarını çıkartın veya poyra yaylarını dışarı fırlatılmaya karşı emniyete alın.
- Dönen parçalara dokunmayın.
- Çıkış elemanlarını dokunmaya karşı korumayla koruyun.



⚠ İKAZ

Soğutma sisteminin çatlamasından kaynaklanan ölüm tehlikesi vardır

Bir motor soğutmasız olarak kullanıldığında, motor aşırı ısınır. Soğutma suyu sıcak makineden akarsa, yüksek basınç altında ani sıcak buhar oluşur. Bunun sonucunda soğutma suyu sistemi çatlayabilir ve ölüm, ağır yaralanma ve maddi hasara neden olabilir.

- Motoru asla soğutmasız çalıştırmayın.
- Soğutma devridaimini ancak motor soğumuşken çalıştırın.

⚠ İKAZ

Saçların ve giysi eşyalarının harici fan tarafından emilmesinden kaynaklanan ölüm tehlikesi vardır

Hava girişinde örneğin saçlar, kravatlar, boştaki eşyalar vs. için emilme tehlikesi vardır.

- Kravatınızı çıkartın.
- Saçları korumak için şapka veya saç fileleri kullanın.
- Emme alanını boştaki eşyalardan arındırın.
- Saçların ve giysi eşyalarının emilmesine karşı uygun güvenlik önlemleri alın.



DİKKAT

Sıcaklığa duyarlı parçalarda termik hasar

Motordaki +100 °C'yi aşan yüzey sıcaklıkları görülebilir. Motora dayanan veya takılan, sıcaklığa karşı duyarlı parçalar zarar görebilir. Sıcaklığa duyarlı parçalar, örneğin hatlar veya elektronik parçalardır.

- Sıcaklığa duyarlı parçaları motora takmayın.
- Sıcaklığa duyarlı parçaların motora dayanmadığından emin olun.



DİKKAT

Motorda termik hasar

Motor aşırı ısındığında sargılar ve yataklar parçalanabilir.

- Motorları ancak etkili bir sıcaklık kontrolüyle çalıştırın.

DİKKAT**Maksimum devir sayısının aşılmasından kaynaklanan motor hasarı**

Azami devir sayısı n_{maks} , izin verilen en yüksek işletme devir sayısıdır. Maksimum devir sayısı n_{maks} , güç levhasında (tip levhası) belirtilmiştir.

İzin verilmeyen devir sayıları, motorda hasarlara neden olabilir.

- Tahrikteki kumanda veya etkinleştirilen devir sayısı kontrolüyle, izin verilen maksimum devir sayısının aşılmasını sağlayın.

DİKKAT**Durdurma freninin arızalanması veya bozulması**

Durdurma freni işletme freni olarak kullanılırsa, durdurma freni arızalanır veya parçalanır.

- Durdurma frenini elektrikli olarak, işletme freni olarak kullanılamayacak şekilde ayarlayın.
- Durdurma freninin mikro şalterinin kumandaya bağlanması ve değerlendirilmesi gerekir (ayrıca 4BZFM 100 durdurma freninin ek sayfasına da bakın).
- Motorun durdurma freni kapalıyken çalıştırılması mümkün olmamalıdır.
- Durdurma freni ancak motor dururken çalıştırılabilir.

Not**"Yüksek performans" ve "Premium performans" yatak modelindeki gres dağıtım işlemi**

1PH8 "Yüksek performans" ve "Premium performans" tahrikleri üreticide yakl. 15 dakikalık bir gres dağıtım işlemine tabi tutulur. Bu başlatma süresinden sonra motorlar, kullanıcıda depolama hasarlarına neden olmadan maksimum devir sayısına kadar kullanılabilir.

Rulman yataklarında ideal yağ tabakası oluşturan gres dağıtım ancak yakl. 30 saatlik kullanım süresinden sonra tamamlanmış olur.

Artan yağ, rulman yatakları kafesinden dışarı atıldığında, zorunlu olarak potansiyel bir yatak arızasına işaret etmesi gerekmeyen gürültüler oluşabilir.

6.2**Devreye almayla ilgili kontrol listeleri****Not****Gerekli kontroller**

Aşağıdaki listenin eksiksiz olduğu iddia edilemez. Ayrıca özel duruma özel koşullara uygun diğer kontrollerin de yapılması gerekir.

6.2 Devreye almayla ilgili kontrol listeleri

- Tesisi devreye sokmadan önce, onun amacına uygun bir biçimde takıldığını ve bağlandığını kontrol edin.
- Tahrik sistemini konvertörün veya invertörün kullanım kılavuzuna göre devreye alın.
- Çalışmaya başlamadan önce güvenlik uyarılarını öğrenin ve aşağıdaki kontrol listelerine uyun.

Tablo 6-1 Kontrol listesi (1) – genel kontrollörler

Kontrol	Normal.
Projelendirilmiş tahrik grubunun gereken tüm bileşenleri mevcut mu, doğru boyutlandırılmış mı, uygun şekilde yapılandırılmış mı ve bağlanmış mı?	
Sistem bileşenleri (örneğin tahrik sistemi, verici, soğutma sistemi, fren) ve projelendirme el kitabı "Ana motorlar SIMOTICS M-1PH8" için üretici belgeleri mevcut mu?	
SINAMICS S120 tahrik sistemli 1PH8 motorunu beslemede: Aşağıda belirtilen SINAMICS belgelerinin geçerli versiyonu hazır mı? • SINAMICS S120 Devreye sokma el kitabı • İlk çalıştırma S120 • Fonksiyon kitabı S120 • Liste el kitabı S120/150 • "Premium performans" yatak modelini devreye sokma talimatı (ayrıca ""Premium performans" yatak modeli" bölümüne de bakın)	
SINAMICS S120 tahrik sistemli 1PH8 motorunu beslemede: SINAMICS S120 devreye sokma elkitabındaki "SINAMICS S'yi devreye sokmayla ilgili kontrol listeleri" bölümü dikkate alındı mı?	
Devreye alınacak olan motor tipi biliniyor mu? (Örn. 1PH8 ___ - ___ - ___)	
Ortam koşulları, izin verilen alanda mı?	

Tablo 6-2 Kontrol listesi (2) – mekanik kontrolü

Kontrol	Normal.
Hareketli ve gerilim ileten parçalar için sürtünmeye karşı tüm koruma önlemleri uygulanmış mı?	
Motor amacına uygun bir biçimde takılmış ve hizalanmış mı?	
Rotor, statora çarpmadan çevrilebiliyor mu?	
İşletim koşulları, etiketteki bilgilere göre belirlenen verilere eşit mi?	
Tüm tespit civataları, bağlantı elemanları ve elektrik bağlantıları iyice sıkılmış ve doğru takılmış mı?	
Tahrik elemanları türe bağlı olarak doğru ayarlama koşullarına sahip mi? Örnekler: • Kavramalar ayarlanmış ve dengelenmiş mi? • Bir kayış tahrikinin kayış gerginliği doğru ayarlanmış mı? • Dişli kenarı ve dişli ucu boşluğu ve bir dişli çıkışının radyal boşluğu doğru ayarlanmış mı?	

Tablo 6-3 Kontrol listesi (3) – elektrik kontrolü

Kontrol	Normal.
Motor, belirlenen dönüş istikametine göre doğru bağlanmış mı?	
Minimum yalıtım dirençlerine uyulmuş mu?	
Topraklama bağlantıları ve potansiyel dengeleme bağlantıları amacına uygun bir biçimde üretilmiş mi?	
Mevcut frenler kusursuz bir şekilde çalışıyor mu?	

Tablo 6-4 Kontrol listesi (4) – kontrol cihazları kontrolü

Kontrol	Normal.
Maksimum devir sayısından n_{maks} daha yüksek devir sayısının çalıştırılmaması sağlanmış mı?	
Makine denetimi için mevcut tüm ek donanımlar uygun bir biçimde bağlanmış ve çalışıyor mu?	

Tablo 6-5 Kontrol listesi (5) – soğutma sistemi kontrolü

Kontrol	Normal.
Su soğutması Soğutma suyu beslemesi bağlı ve çalışmaya hazır mı? Soğutma suyu devridaimi (akış, sıcaklık) verilen değerlere uygun mu?	
Harici havalandırma Güvenlik tekniğiyle ilgili ve fonksiyonel tüm detayları kontrol ettiniz mi? Örnekler: • Harici soğutma sisteminin verilerini besleme verileriyle karşılaştırdınız mı? Harici soğutma sistemi, harici soğutma sisteminin besleme verileri, bir aşırı yüklenme durumu oluşacak kadar büyük bir farklılık gösterdiğinde bağlanmamalıdır. • Aksesuar bileşenleri de dahil, harici havalandırma biriminin elektrik kurulumu normalse, örneğin koruyucu iletken bağlanmış mı? • Güvenlikle ilgili parçaların mekanik montajı ve elektrik kurulumu normal mi? Buna örneğin bir motor koruma şalterinin kurulumu ve koruyucu ızgaraların montajı da dahildir. • Kablo bağlantılarının sızdırmazlığı normal mi? • Fanın hava girişindeki ve fan kanadı alanındaki yabancı cisimler giderilmiş mi? • Fanın dönüş istikameti doğru mu? Fanın tip levhasında bir ok bulunmaktadır. Bu ok, fanın doğru dönüş yönünü gösterir. Fan küreklerine de bir ok basılıdır. Fan başlatılırken, oklar yardımıyla dönüş istikameti gözle kontrol yoluyla tespit edebilirsiniz. Dönüş istikameti, fan güç levhasının okunun yönüyle eşitse, fanın çalışması doğrudur.	

Tablo 6-6 Kontrol listesi (6) – isteğe bağlı frenin kontrolleri

Kontrol	Normal.
Çalışma gerilimi oluşturulduğunda fren havalandırılıyor mu?	
Freni açma ve kapatma doğru çalışıyor mu?	

Tablo 6-7 Kontrol listesi (7) – rulman yatakları kontrolleri

Kontrol	Normal.
Rulman yatakları normal mi?	
Motorlar depolandığında bölüm "Depolama" altında belirtilen depolama koşullarına ve bölüm "Depo değiştirme süreleri" altında belirtilen sürelerle uyulmuş mu?	

6.3 "Premium performans" yatak modeli

Not

Devreye sokma sırasında parametre uyarlamaları gerekir

"Premium performans" yatak modelindeki motorlar şu an "Tak-çalıştır bileşenleri" değildir. Devreye sokanın kendisinin, motorları DRIVE-CLiQ ile otomatik olarak devreye soktukten sonra parametre uyarlamalarını gerçekleştirmesi gerekir. Örnek: V ve W sargı modelli motorlar (sipariş numarasının 10. basamağı) için 8 kHz'lik bir darbe frekansı gerekir. Bu değer şu an otomatik olarak dönüşmez. Bu motorlarda ayrıca akım regülatörünün adaptasyonu da gerekir. Bu parametreler şu an DRIVE-CLiQ arabiriminin verilerinde kayıtlı değildir. Devreye sokan kişinin bu parametreleri manuel olarak uyarlaması gerekir. Bu motorlar ancak SINAMICS S120 tahrik sistemindeki hızlı bir akım regülatörü (p1810.11 = evet) ile çalıştırılabilir.

Devreye sokmanın tam doğru yöntemi için, Siemens servis merkezinizden devreye sokma talimatını temin edin. İletişim verilerini girişte Teknik destek altında bulabilirsiniz.

6.4 İzolasyon direncinin kontrolü

Uzun depolama veya bekleme süresinden sonra sarımların izolasyon direnci doğru akım ile toprağa doğru, tespit edilmelidir.



⚠ İKAZ

Elektrik çarpmasından kaynaklanan ölüm tehlikesi

Ölçüm sırasında ve hemen sonrasında bağlantılarda kısmen dokunulduğunda ölüm tehlikesine neden olabilecek tehlikeli gerilimler olabilir.

- Yalıtım dirençlerinin kontrolünü ancak gerekli niteliklere sahipseniz yapın.
- Yalıtım direncini ölçmeye başlamadan önce, kullanılan yalıtım ölçme cihazının kullanım kılavuzuna uyun.
- Ölçüm sırasında veya hemen sonra bağlantılara dokunmayın.
- Bağlı şebeke hatlarına şebeke gerilimi verilememesi hususunu emniyet altına alınız.

- Sargının makine mahfazasına karşı izolasyon direncini her zaman 20 °C ile 30 °C arasındaki bir sargı sıcaklığında ölçülmelidir.
- Ölçüm sırasında, direncin nihai değerine ulaşılmasını bekleyin (bu işlem yakl. bir dakika sürebilir).

Sınır değerler

Aşağıdaki tabloda makinenin $U_N < 2$ kV ölçüm geriliminde, minimum izolasyon direnci için sınır değerleri, ölçüm gerilimi ve kritik izolasyon direnci verilmektedir.

Tablo 6-8 Stator sargısının 25 °C'de izolasyon direnci

	Nominal gerilim $U_N < 2$ kV
Ölçüm gerilimi	500 V (minimum 100 V)
Yeni, temizlenmiş veya onarılmış sargılardaki minimum izolasyon direnci	10 MΩ
Uzun çalışma süresinden sonra kritik spesifik izolasyon direnci	0,5 MΩ / kV

Dikkat etmeniz gerekenler:

- Kuru, yeni sargıların izolasyon dirençleri 100 MΩ ile 2000 MΩ arasında olup, gerektiğinde daha yüksek değerlere de ulaşabilir. İzolasyon direnci minimum değerin yakınındaysa, nemden ve/veya biriken kirden kaynaklanıyor olabilir.
- Kullanım süresi sırasında sargıların izolasyon direnci, çevre ve çalışma etkilerinden dolayı azalabilir. 25 °C sargı sıcaklığında izolasyon direncinin kritik değeri, ölçüm gerilimine göre, ölçüm gerilimi (kV) ile spesifik kritik direnç değerinin (0,5 MΩ / kV) çarpılmasıyla elde edilir. Örnek: Nominal gerilim için kritik direnç (U_N) 0,6 kV:
 $0,6 \text{ kV} \times 0,5 \text{ M}\Omega/\text{kV} = 0,3 \text{ M}\Omega$

Not

Kritik yalıtım direncine ulaşıldığında sargıları temizleyin ve/veya kurutun

Eğer izolasyon direnci kritik değere ulaşır veya bunun altına düşerse, sargılar kurutulmalı veya rotor sökölükken derinlemesine temizlenmeli ve kurutulmalıdır.

Temizlenmiş sargıları kuruttuktan sonra izolasyon direncinin sıcak sargılardakinden daha düşük olmasına dikkat edin. İzolasyon direnci ancak oda sıcaklığına (yakl. 20 °C ila 30 °C) kadar soğutulmuş bir sargının ölçülmesi halinde doğru yorumlanabilir.

Not

Ölçülen değer, kritik değere yakın

Ölçülen değer kritik değere yakınsa, izolasyon direnci daha sonraki zamanlarda kısa aralıklarla kontrol edilmelidir.

Değerler, 25 °C'lik sargı sıcaklığında yapılan ölçümler için geçerlidir.

6.5 Kolay açma ve kapatma

Not

ACİL KAPATMA

Kazaları önlemek için, sistemi çalıştırmadan önce ACİL KAPATMA işlevini iyice tanıyın.

Motor, konvertör üzerinden açılır ve kapatılır.

- Bunun için konvertörün işletme kılavuzunu okuyun.

Devreye sokmadan önce

- Konvertörün doğru parametrelenmiş olduğundan emin olun.
- İlgili devreye sokma araçlarını kullanın, örn. "Drive ES" veya "STARTER".
- Soğutma sistemini çalıştırın.

Açma

1. Konvertördeki motoru açın.
2. Motorun sakın çalışmasına dikkat edin.

3. Motor soğutmasının çalışmasını kontrol edin.
4. Güvenlik tertibatlarının fonksiyonunu kontrol edin.
5. Motorun istediğiniz parametrelere ulaşp ulaşmadığını kontrol edin.

Kapama

- Konvertördeki motoru kapatın.

Bununla motoru devreye sokma tamamlanmıştır.



6.6 Soğutma

Su soğutması

İşletmede motorun her zaman soğutma suyu beslemesine bağlanmış olması gerekir.



⚠ İKAZ

Soğutma sisteminin çatlamasından kaynaklanan ölüm tehlikesi vardır

Bir motor soğutmasız olarak kullanıldığında, motor aşırı ısınır. Soğutma suyu sıcak makineden akarsa, yüksek basınç altında ani sıcak buhar oluşur. Bunun sonucunda soğutma suyu sistemi çatlayabilir ve ölüm, ağır yaralanma ve maddi hasara neden olabilir.

- Motoru asla soğutmasız çalıştırmayın.
- Soğutma devridaimini ancak motor soğumuşken çalıştırın.



DİKKAT

Eksik soğutma suyu beslemesi sonucunda aşırı ısınma

Soğutma suyu beslemesi arızalandığı veya motor kısa süreliğine su soğutması olmadan kullanıldığında, motor aşırı ısınır. Maddi hasara veya genel hasara neden olabilir.

- Motoru asla soğutma suyu beslemesini açmadan çalıştırmayın. İzin verilen su giriş sıcaklıklarını denetleyiniz.

Harici havalandırma

Motorun, harici fan devreye sokulmadan çalıştırılmasını sağlayın.



DİKKAT

Harici fan yetersiz olduğunda aşırı ısınma tehlikesi vardır

Harici fan arızalandığı veya motor kısa süreliğine harici fan olmadan kullanıldığında, motor aşırı ısınır. Aşırı ısınma, arızalara neden olabilir ve cihazların/sistemlerin kullanım ömrünü kısaltabilir.

- Motoru her zaman bir harici fanla birlikte çalıştırın.

Not**ACİL KAPATMA**

Kazaları önlemek için, açmadan önce ACİL KAPATMA fonksiyonu hakkında bilgi edinin.

Açma

 İKAZ
Makinenin ve boştaki eşyaların hareketlerinden kaynaklanan ölüm tehlikesi vardır Makinenin ve aşağı düşebilecek veya etrafa savrulabilecek boştaki eşyaların hareketleri ağır yaralanmalara neden olabilir. • Makinedeki tüm montaj ve ayarlama çalışmalarının tamamlandığından emin olun. • Açma sırasında kimsenin tehlikeye sokulmadığından emin olun. • Açmadan önce, makinenin üzerinde, içinde veya yanında düşebilecek veya etrafa savrulabilecek boşta eşya bulunmadığını kontrol edin.

Motor, frekans konvertöründen açılır.

- Bunun için konvertörün işletme kılavuzunu okuyun.

İşletim

Motoru çalıştırma sırasında, belirlenen parametrelere uyulduğundan emin olun.

Aşağıdakilere dikkat edin

- güç tüketimi standart aralıkta olmalıdır
- soğutma sağlandığında
 - Su soğutmada: Sıvı seviyesini ve soğutucunun sirkülasyonunu kontrol edin
 - Harici fanda: Engellenmeyen ısı çıkışını kontrol edin
- motorda anormal gürültü oluşmamalıdır
- motoru aşırı ısıtmayın
- varsa, kapatma havası girişi çalışır

DİKKAT
Aşınmış yataklardan kaynaklanan motor hasarı Aşınmış yataklar, motor hasarına neden olur. • Çalışma durumuna bağlı olarak, yatak değiştirme sürelerine uyun.

Kapama

Motor, frekans konvertöründen kapatılır.

- Bunun için konvertörün işletme kılavuzunu okuyun.

7.1**Arızalar****İKAZ****Etkisiz koruma tertibatları sonucunda tahrik sisteminden kaynaklanan yaralanmalar**

Arızayı arama sırasında koruma tertibatları devre dışı bırakılırsa, yaralanmalar oluşabilir.

- Tahrik sistemini ancak koruma tertibatları çalışırken çalıştırın.

Not**Arızalardan dolayı makinede hasarlar**

- Arıza sebebini yardım önlemlerine göre gideriniz.
- Makinede/motorda oluşan olası hasarları da giderin.

Not

Arıza oluşması durumunda konvertörün işletme kılavuzuna başvurun.

- Normal çalışmaya göre değişiklikler veya arızalar oluşursa, arızanın nedenini "Olası arızalar" tablosu yardımıyla tespit edin.
- Nedenini tespit ettiyseniz, arızayı "Arıza nedenleri ve çözüm önlemleri anahtarı" tablosu yardımıyla gidermeye çalışın.
- Bu sırada bütün tahrik sisteminin bileşenlerinin belgelerindeki söz konusu bölümlere de dikkat edin.

Tablo 7-1 Olası arızalar

Arıza	Arızanın nedeni (anahtar tablosuna bakın)															
Motor çalışmıyor	A	B			E											
Motor çok yavaş çalışıyor	A		C		E	F										
Başlama sırasında takırdama sesi			C		E	F										
Çalışırken takırdama sesi	A		C		E	F										
Yüksüz çalışmada aşırı ısınma				D			G	H	I							
Yük altında aşırı ısınma	A		C				G	H	I							
Münferit sargı bölümlerinin güçlü ısınması					E	F										
Düzensiz gidiş									J	K						
Sürtünme gürültüsü, çalışma gürültüleri											L					
Radyal titreşimler												M	N	O	P	R

Arıza	Arızanın nedeni (anahtar tablosuna bakın)															
Eksenel titreşimler															O	Q R
Su boşalıyor																S

Tablo 7-2 Arıza nedenleri ve çözüm önlemleri anahtarı

No.	Arızanın nedeni	Giderme önlemleri
A	Aşırı yüklenme	Yüklenmeyi azaltınız
B	Taksim tevzi taksim tevzi besleme hattaki/motor sargısındaki bir aşamayı durdurma	Konvertörleri ve gelen hatları kontrol edin/sargı dirençlerini ve yalıtım dirençlerini tespit edin, üreticiyle görüştüktan sonra onarın
C	Çalıştırmadan sonra gelen hattaki bir fazı kesme	Tahriri ve gelen hatları kontrol edin/sargı dirençlerini kontrol edin.
D	Konvertör çıkışı gerilimi çok yüksek, frekans çok düşük	Konvertör ayarlarını kontrol edin, otomatik motor tanıma işlemini uygulayın.
F	Stator sarımında sarım kısa devresi veya faz kısa devresi	Sargı dirençlerini ve izolasyon dirençlerini tespit edin, üreticiye danıştıktan sonra onarın.
G	Soğutma suyu bağlı değil veya kapalı	Soğutma suyu bağlantısını kontrol edin, soğutma suyunu çalıştırın
H	Soğutma suyu akışı çok düşük	Soğutma suyu akışını artırın
	Giriş sıcaklığı çok yüksek	Giriş sıcaklığını doğru ayarlayın
E	Stator sargısı yanlış çalıştırılmış	Sarım devre bağlantısını kontrol ediniz.
I	Birikmelerden dolayı ısı çıkışı engellenir	Tahririn yüzeylerini temizleyin. Soğutma havasının engellenmeden giriş ve çıkışını sağlayın.
	Soğutma havasının girişi ve/veya çıkışı yabancı cisimlerle engellenmiş	Blokajı giderin. Soğutma havasının engellenmeden giriş ve çıkışını sağlayın.
	Fan motoru çalışmıyor	Fan motorunun çalışmasını kontrol edin.
J	Motor ve/veya verici hattının yalıtımı yetersiz	Yalıtımı ve topraklamayı kontrol edin.
K	Tahrik regülatörünün takviyesi çok büyük	Regülatörü uygun şekilde ayarlayın.
L	Dönen parçalarda sürtünme var.	Nedenini tespit edin, etkilenen parçaları sonradan ayarlayın.
	Motordaki yabancı cisimler	Üretici tarafından onarım
	Depolama hasarı	Üretici tarafından onarım
M	Rotorun balansı bozuk	Rotorları ayırın ve yeniden dengeleyin.
N	Rotor konsantrik değil, mil eğik	Üretici ile istişare
O	Kötü ayarlama	Makine grubunu hizalayın, kavramayı kontrol edin.
P	Bağlanmış makinede balans bozukluğu	Bağlı makineyi yeniden dengeleyin.
Q	Bağlanmış makineden darbeler söz konusu	Bağlı makineyi kontrol ediniz.
R	Dişlilerde düzensizlik	Dişlileri onarın.
S	Soğutma suyu hattı/su bağlantısı arızalı.	Sızıntıyı bulun ve gerekirse sızdırmaz hale getirin veya üreticiye danışın

Yukarıda belirtilen önlemlere rağmen hatayı giderilemiyorsa, lütfen üreticiye veya Siemens servis merkezine başvurun.

7.2 Çalıştırma araları

Uzun süreli işletme molalarındaki önlemler

DİKKAT**Gerektiği gibi yapılmayan depolamadan kaynaklanan hasarlar**

Yanlış depolama sonucunda motorda hasarlar oluşabilir.

- Daha uzun süreli işletme molalarında motoru pas koruyucu ve kurutma önlemleriyle (örneğin uygun kurutma maddelerini uygulamayla) koruyun.
- Uzun devre dışı bırakma süresinden sonra tekrar devreye sokma sırasında, bölüm "Devreye sokma" altında belirtilen kontrol ve önlemleri gerçekleştirin.

- Motoru su soğutma sisteminden ayırın.
- Motordaki soğutma suyunu boşaltın.
- Soğutma kanallarını basınçlı hava püskürterek kurutun.
- Uzun süre kullanmayacağınız zaman motoru düzenli olarak, yaklaşık ayda bir kez çalıştırın veya rotoru elle çevirin.
- Tekrar devreye sokmak için çalıştırmadan önce, "Açma ve kapatma" bölümündeki "Açma" kısmına uyun.

**DİKKAT****Dışarı çıkan sıcak soğutma suyundan kaynaklanan yanma tehlikesi**

Daha önce çalışan bir motorun soğutma devridaimini açarsanız, dışarıya sıcak soğutma suyu ve buharı çıkması sonucunda yanma tehlikesi vardır.

- Motorun soğutma devridaimini ancak motor soğuduğunda açın.

**DİKKAT****Temizlik maddelerine ve deterjanlara temastan kaynaklanan yaralanma tehlikesi**

Temizlik maddelerine ve deterjanlara temas, cilt ve mukoza tabakalarında tahriş veya aşınmaya neden olabilir.

- Temizlik maddelerinin ve deterjanların varillerindeki tüm güvenlik ve uygulama uyarılarına uyun.
- Açığa çıkan buharların emilmesini veya çalışma alanının iyi havalandırılmasını sağlayın.
- Uygun kişisel koruyucu donanımlar (örneğin koruyucu gözlük, eldiven, solunum filtresi) kullanın.

**DİKKAT****Savrulan parçacıklardan kaynaklanan yaralanmalar**

Basıncı hava ile temizleme sırasında toz, metal talaşları veya temizlik maddeleri savrulabilir ve yaralanmalara neden olabilir.

- Basıncı hava ile temizlik yaparken, havanın uygun şekilde emilmesine dikkat ediniz.
- Uygun kişisel koruyucu donanımlar (örneğin koruyucu gözlük, eldiven, solunum filtresi) kullanın.

8.1 Denetim ve bakım

8.1.1 Genel denetim verileri

Denetim için motor, parçalarına ayrılır.

Emin olmadığınızda, makine tipini ve seri numarasını belirterek üreticiyle görüşün.

Denetim ve bakım çalışmalarını bir Siemens servis merkezine yaptırmanız tavsiye edilir. İletişim verilerini girişte "Teknik destek" altında bulabilirsiniz.

8.1.2 Bakım ve denetim aralıkları

Genel

- Arızalar erkenden fark etmek ve gidermek için, motoru düzenli olarak inceleyin ve bakımdan geçirin.

DİKKAT

Makinedeki takip hasarları

Örneğin aşırı yüklenme veya kısa devre gibi, olağanüstü koşullar veya motorun arızaları, makinede müteakip hasarlara neden olabilir.

- Arızalarda veya olağandışı koşullarda motoru hemen denetleyin.

Temizlik

- Yeterli kayıp ısısının uzaklaştırılması için, tahrik sistemini düzenli olarak temizleyin.

Denetim/bakım aralıkları, süreler, önlemler

Bakım aralıkları, kullanım koşullarına bağlıdır.

- Bakım aralıklarını kir, çalıştırma sıklığı, kapasite vs. gibi yerel koşullara göre ayarlayın.
- Aşağıdaki önlemleri, tabloda verilen bilgilere göre gerçekleştirin.

Tablo 8-1 İşletme süresi aralıkları veya süreler ve önlemler

İşletme süresi aralıkları veya süreler	Önlemler
500 kullanım saatinden, en geç 6 ay sonra	İlk kontrol
yakl. her 8000 kullanım saatinde bir, en geç 2 yıl sonra yakl. her 5000 kullanım saatinde bir, en geç 2 yıl sonra	Ana denetim radyal mil conta halkasız radyal mil conta halkalı
tavsiye edilen yatak değiştirme süresine göre (bakın bölüm "Yatak değiştirme süresi")	Yatağı değiştirin
Yaklaşık her 5000 çalışma saatinde bir	Radyal mil conta halkalarını değiştirme
Bölgesel kirlenme derecesine göre	Harici havalandırmada fanı temizleme
gerekli soğutma suyu kalitesine uyulduğunda bakım gerektirmez	Su soğutmasındaki soğutma suyu sistemi

8.1.3 İlk kontrol

İlk denetimi

- montaj
- sonrasında 500 kullanım saatinden, en geç motoru onardıktan 6 ay sonra
- gerçekleştirin.

Not

Denetimi, tesise özel koşullara uygun hale getirin.

Diğer kontroller, diğer parça belgelerinden veya tesise özgü özel koşullardan dolayı ilaveten gerekir.

Kontrol kapsamı

Motor çalışırken,

- elektrik referans değerlerine uyulup uyulmadığını
- trifaze akım motorunun düzenli çalışmasının ve çalışma gürültülerinin değişip değişmediğini kontrol edin.

DİKKAT
Denetim sırasındaki özellikleri göz ardı etmeden kaynaklanan makine hasarları Denetim sırasında tespit edilen, ancak göz ardı edilen özellikler, makinede hasara neden olabilir. • Analiz edin ve tespit edilen durumları, "Arızalar" ve "Onarım" bölümlerini dikkate alarak gidin. • Destek gerektiğinde Siemens servis merkezine başvurun.

8.1.4 Ana denetim

Not

Denetimi, tesise özel koşullara uygun hale getirin.

Diğer kontroller, diğer parça belgelerinden veya tesise özgü özel koşullardan dolayı ilaveten gerekir.

Kontrol kapsamı

Motor çalışırken,

- elektrik referans değerlerine uyulup uyulmadığını
- trifaze akım motorunun düzenli çalışmasının ve çalışma gürültülerinin değişip değişmediğini kontrol edin.

Motor dururken,

- motorun temelinde çökme veya çatlak oluşmadığını
- makine yönünün izin verilen toleranslarda olduğunu
- mekanik ve elektrikli bağlantıların tüm tespit cıvatalarının iyice sıkılmış olduğunu
- sargıların izolasyon direncinin izin verilen tolerans alanında olduğunu
- olası bir yatak izolasyonunun etikete göre yapıldığını kontrol edin.
- hatların ve izolasyon parçalarının uygun durumda olduğunu ve renklerinin solmadığını
- rulman yataklarının izin verilen radyal kuvvetlerine (çapraz kuvvetlere) uyulduğunu kontrol edin.

Not

İzin verilen radyal kuvvetler, NC 62, D 21.4 katalogunda ve "Ana motorlar SIMOTICS M-1PH8" projelendirme elkitabında bulunur.

DİKKAT**Denetim sırasındaki özellikleri göz ardı etmeden kaynaklanan makine hasarları**

Denetim sırasında tespit edilen, ancak göz ardı edilen özellikler, makinede hasara neden olabilir.

- Analiz edin ve tespit edilen durumları, "Arızalar" ve "Onarım" bölümlerini dikkate alarak giderin.
- Destek gerektiğinde Siemens servis merkezine başvurun.

8.1.5 Yatak değiştirme öneli

Yataklar aşınmaya tabidir ve belirlenen bir çalışma süresinden sonra değiştirilmeleri gerekir. Tavsiye edilen yatak değiştirme süreleri t_{LW} aşağıdaki tabloda belirtilmiştir.

Özellikle çok uygun işletme koşullarında, örneğin düşük orta devir sayısı, düşük radyal güç (çaprazlamasına güç) ve titreşim yükünde yatakların kullanım ömrü uzayabilir.

Not

Zor işletim koşulları

Zor işletme koşullarında yatak değiştirme süreleri t_{LW} yüzde 50'ye kadar kısılır.

Zor işletme koşulları örneğin

- n_{maks} ile sürekli çalışma
- yüksek titreşim ve darbe yükleri
- sıkça yapılan ters yönde işletim

Tablo 8-2 Yatak modeli, maksimum devir sayıları ve yatak değiştirme süreleri

Aks yük-sekliği	Yatak malzeme cinsi	Maksimum devir sayısı n_{maks} / 1/dak	Orta çalışma devir sayısı n_m / 1/dak	Saat olarak istatistik depo ömrü L_{10h}	Tavsiye edilen yatak değiştirme süresi t_{LW} /saat	
					Kullanım ömrü boyunca yağlama	Ek yağlama
80	Sabit yatakla standart	10000	< 8000	20000	20000	-
	Sabit yatakla standart (seçenek L37)	12000	< 8500	12000	12000	-
	Standart	10000	< 6000	20000	20000	-
	Performans	15000	< 11500	12000	12000	-
	Yüksek Performans	20000	< 13000	12000	12000	-
	Genişletilmiş kullanım ömrü	5000	< 3500	40000	40000	-
100	Sabit yatakla standart	9000	< 7000	20000	20000	-
	Sabit yatakla standart (seçenek L37)	10000	< 7300	12000	12000	-
	Standart	9000	< 5000	20000	20000	-
	Performans	12000	< 10500	12000	12000	-
	Yüksek Performans	18000	< 11500	12000	12000	-
	Genişletilmiş kullanım ömrü	5000	< 3000	40000	40000	-
	Artırılan radyal güçler	7000	< 2300	20000	20000	-

Orta devir sayısını hesaplama

$$n_m = \frac{n_1 t_1 + n_2 t_2 + \dots + n_i t_i}{100}$$

8.1 Denetim ve bakım

Tablo 8-3 Maksimum devir sayısında tavsiye edilen yatak değiştirme süreleri

Aks yüksekliği	Yatak malzeme cinsi	Maksimum devir sayısı n_{maks} / 1/dak	Saat olarak istatistik depo ömrü L_{10h}	Tavsiye edilen yatak değiştirme süresi t_{LW}/saat	
				Kullanım ömrü boyunca yağlama	Ek yağlama
80	L37 seçeneği	12000	8000	8000	-
	Performans	15000	8000	8000	-
	Yüksek Performans	20000	8000	8000	-
100	L37 seçeneği	10000	8000	8000	-
	Performans	12000	8000	8000	-
	Yüksek Performans	18000	8000	8000	-

Not

1PH8 motorları için, Siemens servis merkezinden temin edebileceğiniz özel yataklar gerekir.

8.1.6 "Premium performans" yatak modeli

Tablo 8-4 "Premium performans" yatak modeli, maksimum devir sayıları ve yatak değiştirme süreleri

Aks yüksekliği	Maksimum devir sayısı n_{maks} / 1/dak	Orta çalışma devir sayısı n_m 1/dak	Saat olarak tavsiye edilen yatak değiştirme süresi t_{LW}	
			kapatma havası **	kapatma havasız
80	24000	< 16000	12000	
		< 19200*	10000	8000
		24000	7000	4000

* Devir sayısı boşluğuyla:

** Kapatma havası bağlantısı (seçenek Q12)

$t_1 = 10$ dak, $n_1 = 0$

$t_2 = 30$ dak, $n_2 = 16000$ 1/dak

$t_3 = 60$ dak, $n_3 = 24000$ 1/dak

Not**Kapatma havasını kalıcı olarak çalıştırma**

Yatak modeli "Premium performans" için, n_{maks} ile sürekli çalışmada kapatma havasını kalıcı olarak çalıştırmanız önerilir. Kapatma havası bağlantısı ve şartlandırma için bakın bölüm "Kapatma havası bağlantısı (seçenek Q12)".

Not**Zor işletim koşulları**

Zor işletme koşullarında yatak değiştirme süreleri t_{LW} yüzde 50'ye kadar kısılır.

Zor işletme koşulları örneğin

- n_{maks} ile sürekli çalışma
- yüksek titreşim ve darbe yükleri
- sıkça yapılan ters yönde işletim

8.1.7**Motoru ve fanı temizleme (harici fan)**

- Motorun ve harici havalandırma biriminin kirlenme derecesini düzenli olarak kontrol edin.
- Artık yeterli bir soğutma kalmadıysa, motoru ve harici havalandırma birimini temizleyin.

Temizliği hazırlama

 İKAZ
Dönen fan kanatlarından kaynaklanan ölüm tehlikesi vardır Dönen fan kanatları, harici havalandırma birimindeki tamir ve bakım çalışmalarında ağır yaralanmalara neden olabilir. • Harici havalandırma birimini kapatın. • Harici havalandırma biriminin akım devresini kesin ve harici havalandırma birimini yeniden çalıştırmaya karşı emniyete alın. • Mümkünse fan kanatlarını dönmeye karşı emniyete alın.

1. Motoru ve harici havalandırma birimini kapatın.
2. İki tam kutupluyu da gerilimsiz hale getirin.
3. İkisini de yanlışlıkla yeniden çalıştırılmaya karşı emniyete alın.
4. Cihaza ancak gerilime yönelik tüm kutuplar kapatıldıktan beş dakika sonra temas ediniz.
5. Motorun ve harici havalandırma biriminin soğumasını sağlayın.
6. Fan kanadını temizlemek için, ızgarayı fan biriminden ayırın. Motor, koruyucu ızgarada kalır.
7. Mümkünse fan kanatlarını dönmeye karşı emniyete alın.



Temizlik**! İKAZ****Deterjanlardan kaynaklanan patlama tehlikesi, ölüm tehlikesine neden olur**

Deterjan kullanıldığında, bir tutuşturma kaynağıyla temas ettiğinde patlamaya neden olabilecek buharlar yayılır. Patlama ölümcül yaralanmalara neden olabilir.

- Tüm ateş kaynaklarını çıkartın veya silin.
- Ancak kıvılcım oluşumu görülmeyen aletler kullanın.
- İyi havalandırma sağlayın.

**! DİKKAT****Temizlik maddelerine ve deterjanlara temastan kaynaklanan yaralanma tehlikesi**

Temizlik maddelerine ve deterjanlara temas, cilt ve mukoza tabakalarında tahriş veya aşınmaya neden olabilir.

- Temizlik maddelerinin ve deterjanların varillerindeki tüm güvenlik ve uygulama uyarılarına uyun.
- Açığa çıkan buharların emilmesini veya çalışma alanının iyi havalandırılmasını sağlayın.
- Uygun kişisel koruyucu donanımlar (örneğin koruyucu gözlük, eldiven, solunum filtresi) kullanın.

DİKKAT**Fan kanadı aşırı kuvvet etkisinden dolayı hasar görebilir**

Aşırı kuvvet etkisi olduğunda fan kanadı hasar görebilir.

- Fana aşırı kuvvet uygulanmasını önleyin.

Not

Fan kanadını temizlemek için hav bırakmayan bir bez veya motorun iç bölmesine nem kaçırmadan yumuşak bir fırça kullanın.

- Motoru ve harici havalandırma birimini piyasadaki yaygın temizlik maddeleriyle temizleyin.

Temizlikten sonra**Prosedür**

1. Motorun ve harici havalandırma biriminin kurumasını sağlayın.
2. Bir ıslak temizlikten sonra izolasyon direncini kontrol edin.
3. Varsa, fan kanadının dönme korumasını sökün.
4. Koruyucu ızgarayı (faniyla) tekrar fan birimine vidalayın.
Bunun için 1PH808'de dört cıvatayı veya 1PH810'da altı cıvatayı 3,5 Nm ± 0,5 Nm torkuyla sıkın.
5. Tüm temizlik eşyalarını ve temizlik maddelerini çıkarttığınızdan emin olun.

6. Temizlik için çıkartılan tüm parçaları tekrar geri takıp takmadığınızı kontrol edin.
7. Gerilim beslemesini tekrar sağlayın.
8. Motoru ve harici havalandırma birimini tekrar açın.



8.1.8 Verici değişikliği

Motor yatakları yenilendiğinde, kendi depolanan vericileri de değiştirmeniz tavsiye edilir.

8.2 Onarım

DİKKAT
Elektrostatik tehlike altındaki parçalarda hasar DRIVE-CLiQ arabiriminin, elektrostatik tehlike altındaki parçalarla (EGB) doğrudan teması vardır. Verici sistemleri ve sıcaklık sensörleri, elektrostatik tehlike altındaki parçalardır (EGB). Bağlantılara elinizle veya elektrostatik olarak yüklü aletlerle dokunursanız, elektrostatik açıdan hassas bileşenler zarar görebilir. Bunun için, "Elektrostatik tehlike altındaki yapı elemanlarını (EGB) kullanma" bölümündeki bilgilere dikkatli bir şekilde uyun.

Motorun Bad Neustadt'taki Siemens servis merkezi tarafından veya üzerinden çözülmesini sağlayın.

Motor yataklarını ve arızalı bir vericiyi, motorun kullanım yerinde değiştirebilirsiniz.

- Bu belgedeki uyarıları ve açıklamaları okuyun ve uygulayın

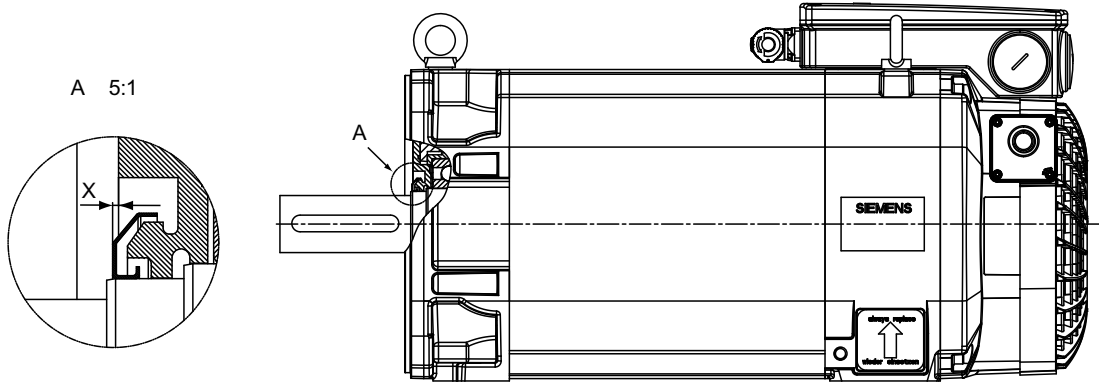
8.2.1 Motoru sökme/takma

Demonte etme

- Sökmeden önce, parçaların birbirine olan konumunu renkli bir kalemle işaretleyin. İşaretler daha sonraki montajı kolaylaştırır.
- Vericiyi sökme için bakın bölüm "Devir sayısı vericisini sökme/takma".
- B tarafındaki yatak levhasının vidalarını sökün ve yatak levhasını çıkartın.
- Depo kapağı vidalarını çözün (bakın "Yedek parçalar", kon. 1.02).
- Fırlatma disklerini tahrik tarafındaki mil demetinden sökün.
- Rotorları statordan çekip çıkartın. Rulman yatağını uygun bir tertibatla çekip çıkartın.

Montaj

- Sadece yeni, kullanılmamış motor yuvalarını takın.
- Yeni rulman yataklarını düzenli olarak 80 ila 100 °C'ye kadar ısıtın ve yatakları geçirin. Bu sırada, yatak iç halkasının mil kenarına dayanması sağlanmalıdır.
- Sert darbelerden kaçının (örneğin çekiçle).
- Motor rotorunu statorun içine sokun.
- Depo kapağını takın.
- B tarafındaki yatağı mil yayıyla (köşe oluşturmadan) B tarafındaki flanşa yerleştirin ve vidaları sıkın.
- Fırlatma diskini (conta dudaksız gama halka mahfazası 9RB...) uygun kovanla $x = 0$ mm ölçüsüne (kapağa bağlıdır) bastırın, bakın resim "Gama halkasını takma". Sökme sırasında hasar gören fırlatma disklerini artık kullanmayın.
"Artırılmış radyal kuvvetler" depo modelinde (sipariş numarasının 14. basamağı = "F") fırlatma diskini, kapağın 1 mm üzerine taşması gerekir, yani ölçü $x = 1$ mm.



Resim 8-1 Gama halkasını takma

Yatak girişi

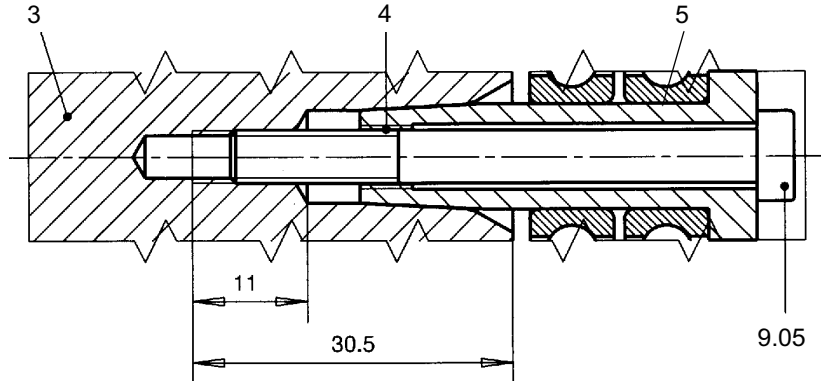
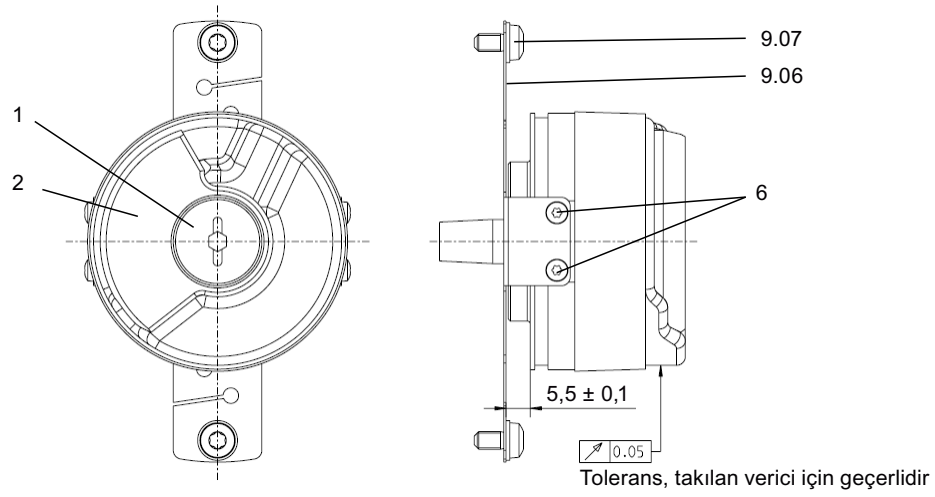
Gres yağının dengeli bir şekilde dağılabilmesi için, yatak değiştirme sonrasında rulman yataklarının çalıştırılması gerekir. Bunun için motoru 15 dakika için bir kez sürekli olarak, maksimum devir sayısının (n_{maks}) %0 ...75'ine getirin.

8.2.2 Devir sayısı vericisini sökme/takma

Not

Devir sayısı vericisini sökme/takma

- Bağlantı kutusunun kapağını sökün ve güç hatlarını ayırın.
- Harici havalandırma birimini (varsa) ve verici kapağını sökün.



- | | | | |
|---|-------------------------|------|------------------------------|
| 1 | Cıvata | 5 | Verici eksen |
| 2 | Fiş kapağı | 6 | Cıvatalar |
| 3 | Motor mili | 9.xx | Bakın bölüm "Yedek parçalar" |
| 4 | Dışarı bastırma dişlisi | | |
- Resim 8-2 Motor mili-verici eksen bağlantısı

Vericiyi sökme

Yöntem

1. Cıvayı (1) çıkartın.
2. Fiş kapağını (2) sökün.
3. Sinyal hattıyla fişi çekin.
4. Tork desteğinin vidalarını (9.07) sökün.
5. Verici vidasını (9.05) sökün (bu sırada motor rotorunun da birlikte dönmemesini sağlayın).
6. Vericiyi motor milinden sökün:
Motor mili ucuna sökme yardımı olarak, merkezleme deliğinin dişlisini korumak için bir dişli cıvatasını, örneğin DIN 913 M5 x 15 vidalayın ve sonra bir cıvata M6 x min. 40 vidalayarak vericiyi dışarı bastırın.



Vericiyi takma

Yöntem

1. Tork desteğini (9.06) vidaların (6) yardımıyla vericiye vidalayın ve (örneğin Loctite 243 ile) sabitleyin. Tork desteğiyle verici arasındaki mesafeyi koruyun! (Verici zaten takılıysa bu adım gerekmez.)
2. Gerekirse, (daha önce vericiyi sökerken kullanılan) dişli pimini sökün.
3. Yedek vericinin civatasını (1) sökün.
4. Yedek vericinin fiş kapağını (2) sökün. Vericiyi (tork desteğiyle) (9.06) motor rotorunun konisine takın ve verici vidasını (9.05) içine vidalayın (sıkma torku 5 ₋₁ Nm). Motor rotorunun da birlikte dönmesini önleyin!
5. Tork desteğini (9.06) vidaların (9.07) yardımıyla yatak levhasına (6.01) takın (vericinin radyal kaymasına dikkat edin).
6. Fiş hattının metal kovanını sıkıca içeri bastırın.
7. Sinyal hatlı fişi takın ve hattı kılavuza yerleştirin.
8. Fiş kapağını (2) civatayla (1) sabitleyin ve örneğin Loctite 243 ile emniyete alın.



8.2.3 Pinyon vericisini sökme/takma

Not

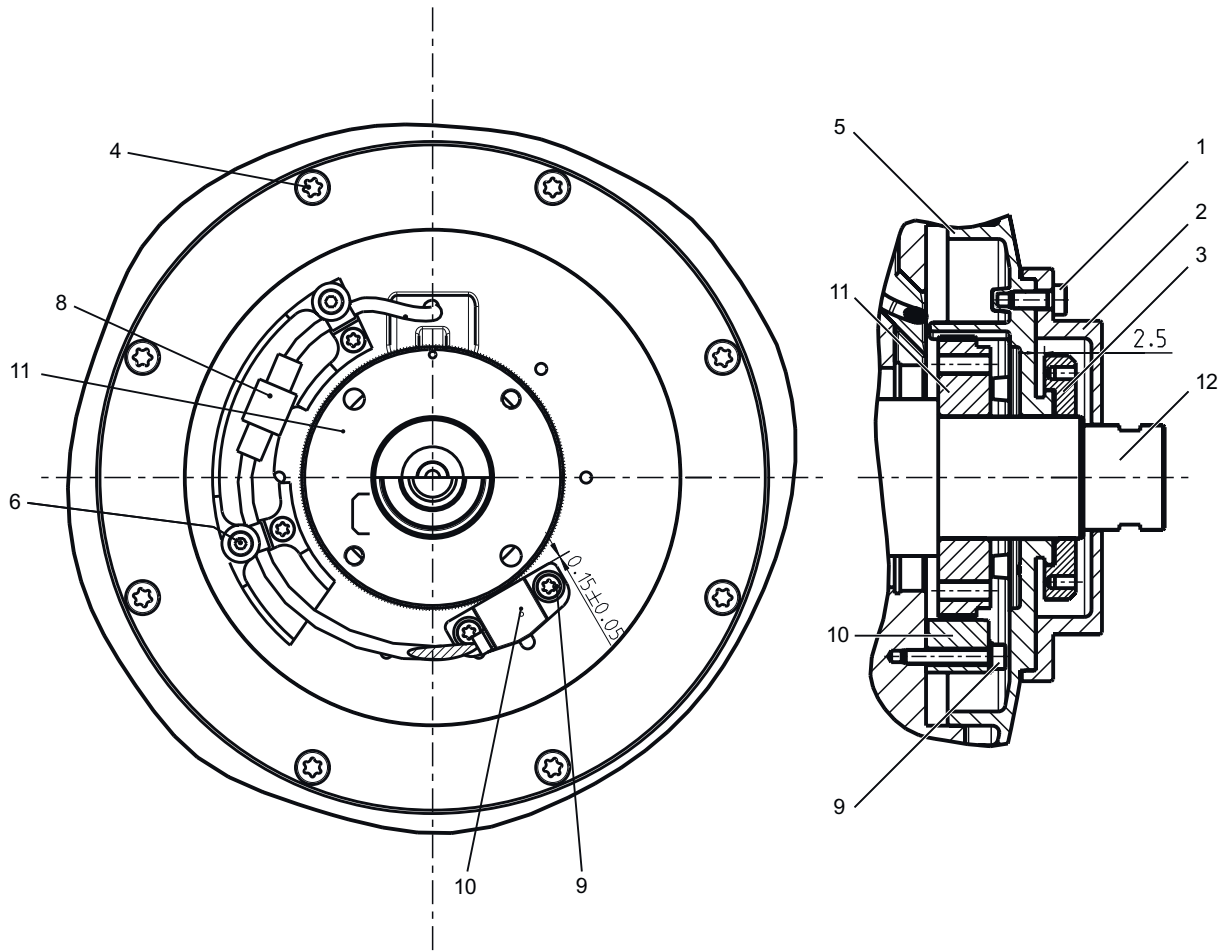
Pinyon verici

DRIVE-CLiQ arabirimsiz pinyon vericisinin tarifi aşağıdaki şekildedir: "Artış verici sin/cos 1 Vpp 256 S/R C ve D yolu yok (kodlayıcı IN256S/R)".

Adı: 1PH8□□□-□C□□□-□□□□

DRIVE-CLiQ arabirimli pinyon vericisinin tarifi aşağıdaki şekildedir: "Değiştirme konumsuz artış verici 19 bit (kodlayıcı IN19DQ)".

Adı: 1PH8□□□-□S□□□-□□□□



- | | | | |
|---|----------------|----|---------------|
| 1 | Cıvatalar | 8 | Fiş |
| 2 | Kapak | 9 | Cıvatalar |
| 3 | Daralama diski | 10 | Sensör birimi |
| 4 | Cıvatalar | 11 | Pinyon |
| 5 | Kapak | 12 | Motor mili |
| 6 | Cıvata | | |

Resim 8-3 Pinyon vericiyi takma

Vericiyi sökme

Yöntem

1. Vidaları (1) çözün ve kapağı (2) sökün.
2. Daralama diskini (3) çekip çıkartın.
3. Vidaları (4) çözün ve kapağı (5) sökün.

4. Sensör birimi
 - Cıvayı (6) çıkartın.
 - Fiş bağlantısını (8) sinyal hattından çıkartın.
 - Diskli vidaları (9) çözün ve sensör birimini (10) sökün.
 5. Pinyon
 - Pinyonu (11) çekip çıkartın.
-

Vericiyi takma

Yöntem

Pinyon vericiyi, sökme sırasının tersini izleyerek, aşağıdaki sapmalarla takın:

1. Pinyonu (11) (yakl. 150 °C'ye) ısıtın, motor milinin (12) başlangıcına kadar takın ve soğumasını bekleyin.
2. Sensör birimini (10) sabitlemek için, vidaları (9) örneğin Loctite 243 ile emniyete alın.
3. Montaj ölçülerine muhakkak uyun (bakın resim "Pinyon vericiyi takma").

□

8.2.4 DRIVE-CLiQ ara biriminin değiştirilmesi (sensör modülü)



İKAZ

Yanlış verici modülünden kaynaklanan ölüm tehlikesi

DRIVE-CLiQ vericisi, motor ve veriye özel veriler ve elektronik bir tip levhası içeriyor. Yanlış bir DRIVE-CLiQ vericisi kullanırsanız, ölüme, ağır yaralanmalara ve ağır maddi hasara neden olabilirsiniz.

- DRIVE-CLiQ vericiyi ve elektronik tip levhasını sadece menşee motoru için kullanın.
- DRIVE-CLiQ vericiyi diğer motorlara takmayın.
- DRIVE-CLiQ vericiyi, başka bir motorun DRIVE-CLiQ vericisiyle değiştirmeyin.
- DRIVE-CLiQ vericinin sadece eğitimli Siemens servis personeli tarafından değiştirilmesini sağlayın.

DİKKAT

Elektrostatik deşarj

Elektronik yapı grupları elektrostatik tehlike altındaki yapı elemanlarını içerir. Bu üniteler öngörüldüğü şekilde kullanılmazsa, çabuk tahrip olabilir.

- Maddi hasarları önlemek için "EGB direktifleri" bölümündeki talimatlara uyun.

8.2.5 Cıvata bağlantılarının sıkma torkları (momentleri)

Metal yerleştirme yüzeylerine yapılan cıvata bağlantılarında, örneğin rulman etiketleri, rulman elemanlarının parçaları, bağlantı kutularının rotor gövdesine vidalanmış parçaları gibi dişli büyüklüğüne bağlı olarak, DIN ISO 898 uyarınca 8.8 ve 8 veya üstündeki sertlik sınıfında $\pm 10\%$ toleransında sıkma momentleri geçerlidir.

Tablo 8-5 Cıvata bağlantılarının sıkma torkları (momentleri)

Dişli çapı	M4	M5	M6	M8	M10	M12	M16
Nm olarak sıkma torku	3	5	9	24	42	70	165

Cıvata emniyetleri

Emniyetli, yaylı ve/veya kuvveti dağıtan elemanlarla birlikte monte edilen cıvata veya somunlar (örneğin emniyet sacları, yaylı rondelalar vs.) birleştirme sırasında tekrar çalışma açısından aynı elemanlarla donatılmalıdır.

Bu arada formunu kaybeden emniyet elemanlarını prensip olarak değiştiriniz.

8.2.6 Durdurma frenini sökme/takma (seçenek)

Durdurma frenini (seçenek) sökme/takma, "Durdurma freni işletme kılavuzu" ekinde tarif edilmiştir.

Yedek parçalar

Not

Grafik olarak gösterim, farklı motor modelleri yerine kullanılmıştır ve ayrıntı açısından tüm modellerde aynı olmayabilir.

Yedek parçalar, servis merkezimizde teknik açıdan mantıklı parça kitleri halinde özetlenmiştir ve motor adları yardımıyla bu ad altında sipariş edilebilir.

"Web'deki yedekler" ile, motorların standart yedek parçalarının ve parça kitlerinin sipariş numaralarını hızlı ve basit bir şekilde tespit edebilirsiniz. Bunun için, aşağıdakilerin altına sipariş numarasını (makine tipi) ve seri numarasını girin: www.siemens.com/sow

1.00 Yatak DE komple

- 1.01 Yatak kapağı
- 1.02 Cıvata
- 1.03 USIT altlık pulu
- 1.04 O-Ring
- 1.05 Kapak
- 1.06 Savurma pulu
- 1.07 Rulman yatakları
- 1.08 Cıvata

6.00 Yatak NDE (komple)

- 6.02 Rulman yatakları
- 6.03 Cıvata
- 6.04 O-Ring
- 6.05 Conta halkası yatak
- 6.06 Aralık pulu
- 6.07 Kıvrımlı yay

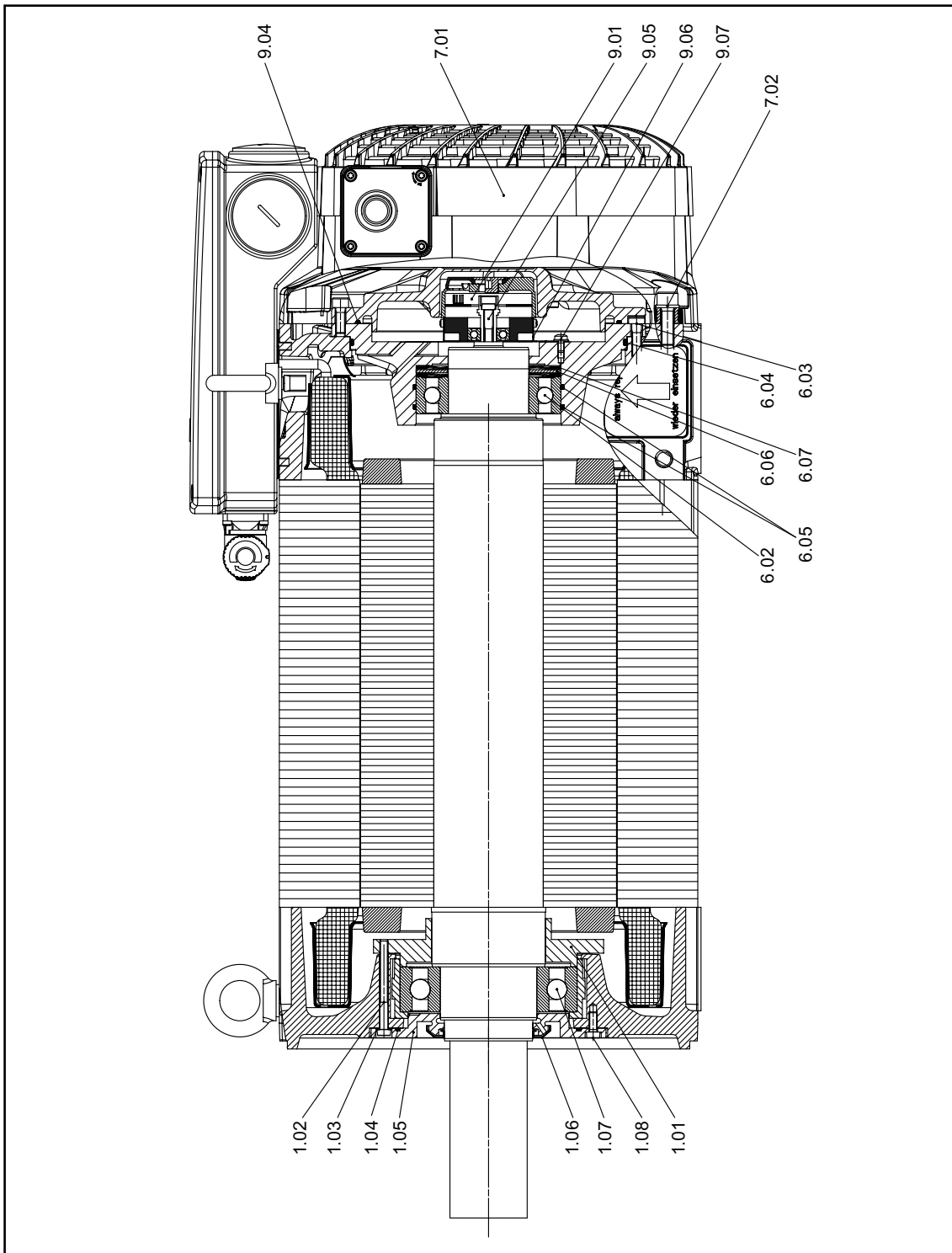
7.00 Komple fan yapı grubu

- 7.01 Fan
- 7.02 Cıvata
- Mil contası (mil contası, rotor kovani ("Yedek parçalar (örnek)" resminde değildir)

9.00 Söz konusu verici türü için verici kiti - tam mil

- 9.01 Verici
- 9.04 O-Ring
- 9.05 Cıvata
- 9.06 Tork desteği

- 9.07 Cıvata
- İçi boş mil verici için verici kiti ("Yedek parçalar (örnek)" resminde değil)
 - Ölçme çarkı
 - O-Ring
 - Sensör başı
 - DRIVE-CLiQ arabirimi ("Yedek parçalar (örnek)" resminde değil)



Resim 9-1 Yedek parçalar (örnek)

Devre dışı bırakma ve bertaraf etme

10.1 Devre dışı bırakma

Makinenin demontajı, uygun uzmanca bilgiye ve eğitime sahip yetkili elemanlar tarafından uygulanmalı ya da denetlenmelidir.

Sökme hazırlığı

1. Yakınıınızda bir atık tasfiye uzman kuruluşu ile iletişime geçin. Motoru parçalarına ayırmanın veya bileşenleri hazırlamanın hangi kalitede yapılması gerekeceğini belirleyin.
2. Bölüm "Temel güvenlik uyarıları (Sayfa 11)" altında sıralanan beş güvenlik kuralına tam uyun.
3. Tüm elektrik bağlantılarını ayırın.
4. Örneğin yağ, su ... gibi tüm sıvıları boşaltın.
5. Tüm kabloları sökün.
6. Motorun bağlantılarını çözün.
7. Motoru, sökme için uygun bir yere taşıyın.



- Bölüm "Bakım (Sayfa 109)" altındaki uyarılara da uyun.
- Motoru genel motor yapım tipine uygun yöntemle göre parçalarına ayırın.



İKAZ

Aşağı düşen makine parçalarından kaynaklanan ölüm tehlikesi vardır

Makine kısmen ağır müstakil bileşenlerden oluşur. Bu bileşenler, makineyi sökerken aşağı düşebilir. Bunun sonucunda ölüm, ağır bedensel yaralanmalar ve maddi hasarlar meydana gelebilir.

- Çözülecek makine bileşenlerini düşmeye karşı emniyete alın.

- Motorları, normal değerli madde sürecindeki ulusal ve yerel kurallara uygun bir şekilde veya üreticiye geri vermek suretiyle bertaraf edin.
- Verici elektroniğini uzmanca elektronik atık şeklinde bertaraf edin.

10.2 Atığa ayırma

Geri dönüşüm ve atığa ayırma



Eski cihazınızın çevreye duyarlı bir şekilde geri dönüştürülmesi ve atığa ayrılması için sertifikalı bir elektrikli ve elektronik eski cihazlar imha servisine başvurun ve eski cihazınızı bulunduğunuz ülkenin yerel yönetmeliklerine göre atığa ayırın.

A.1 Durdurma freni uyarısı

Motora siparişe göre bir durdurma freni takılmış olabilir.

Not

UL sertifikası

Durdurma frenleri UL onaylı değildir. Bu nedenle, fren takılan motorlar cUR işareti yapıştırılmamıştır!

İşletme uyarılarını yanındaki işletme kılavuzunda bulabilirsiniz.

Not

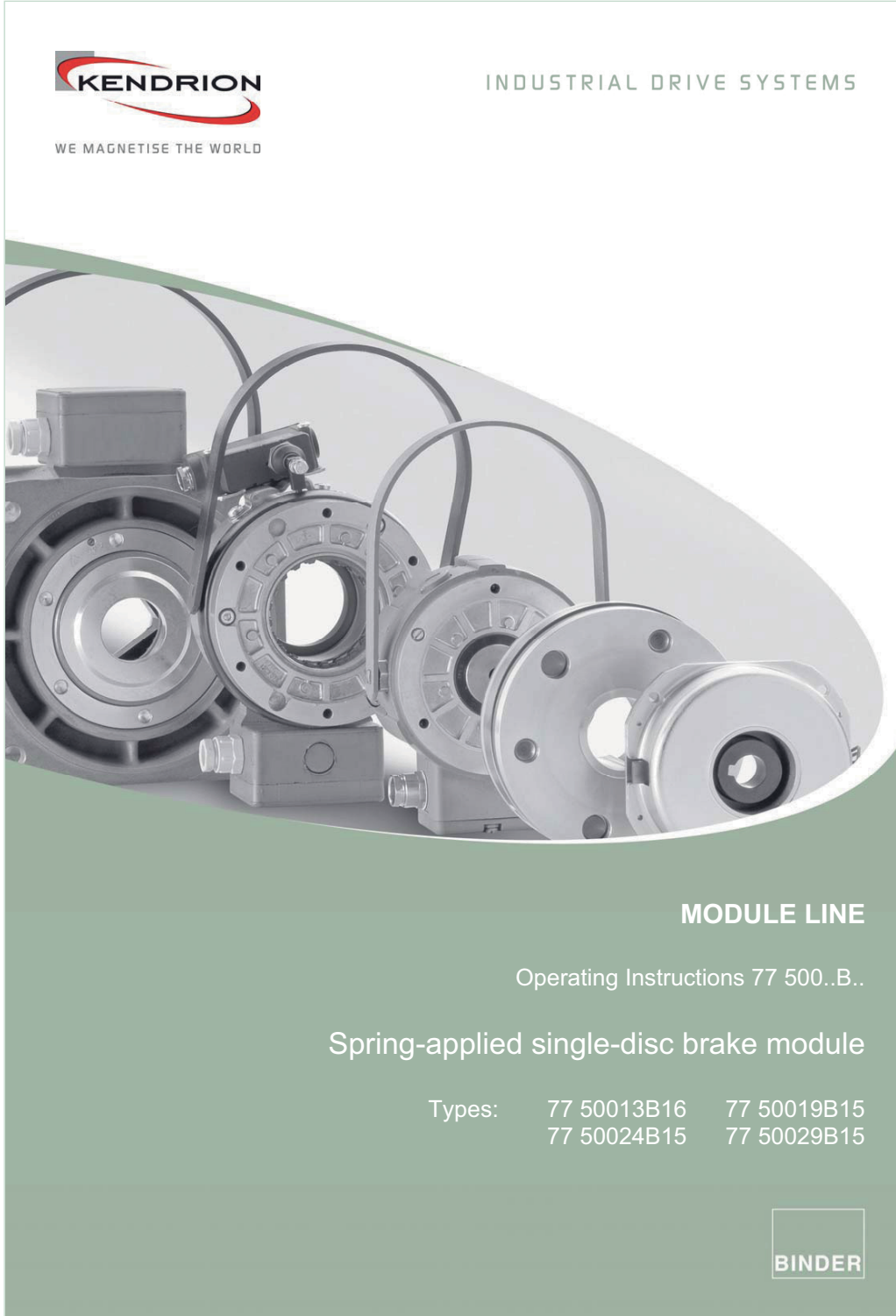
Bakım ve onarım

Bakım ve onarım ancak Siemens'in yetkili personeli tarafından gerçekleştirilmelidir!

Ayrıca bakınız

Özellikler (Sayfa 30)

A.2 Durdurma freninin işletme kılavuzu





Contents

1. General information	3
1.1 Introduction	3
1.2 Standards and directives	3
1.3 Manufacturer's liability	3
1.4 Declaration of Incorporation (in accordance with Annex II, part 1, Section B of Machinery Directive 2006/42/EC)	4
2. Safety	5
2.1 Safety and warning symbols / Safety information	5
2.2 Intended use	5
2.3 General safety information	6
2.3.1 Installation	6
2.3.2 Start-up	6
2.3.3 Operation	6
2.3.4 Maintenance and repair	7
3. Emissions	7
3.1 Noise	7
3.2 Heat	7
3.3 Electromagnetic compatibility	7
4. Product description	10
4.1 Operating principle	10
4.2 Design	10
5. Installation	12
5.1 Mechanical installation	12
5.1.1 Brake shaft (13) installation	12
5.1.2 Mounting the brake module to the motor	13
5.2 Installation of accessories (not applicable to the brake shaft (13))	14
5.3 Electrical connection and operation	15
5.3.1 DC power supply	17
5.3.2 AC power supply	17
5.3.3 Electrical connection of brake modules with microswitch (27)	18
5.4 Set-up and start-up	18
5.4.1 Manual brake release	19
5.5 M ₄ transmissible torque adjustments	20
6. Maintenance	21
6.1 Checks and service	21
6.2 Brake module removal from motor and replacement of component parts	22
6.3 Microswitch (27) adjustment (only applicable to brake modules with microswitch (27))	23
6.4 Brake shaft (13) removal	24
7. Motor design	25
8. Driven components, balancing	26
9. Condition at delivery	26
10. Troubleshooting	27
11. Definitions	28
12. Technical specifications	28
13. Revision history	29

Document information:

Issued by: Kendrion (Villingen) GmbH
 Replacement for document: -
 Type of document: Translation of German operating instructions BA 77 500..B..
 Designation of document: BA 77 500..B.. Englisch

Division: Industrial Drive Systems
 Replaces the issue dated: 2 July 2012
 Document status: Released



1. General information

1.1 Introduction

These Operating Instructions describe the operating principle and features of Kendrion Binder spring-applied single-disc brake modules type 77 500..B...

The safety information provided in this manual must be strictly observed during the set-up of the machine (e.g. motor) and during the start-up, operation and maintenance of the spring-applied brake module.

Should any queries arise with respect to torques, torque variations, installation position, wear, wear reserve, switching work, break-in conditions, release range, ambient conditions and the like, please contact Kendrion Binder and ask for clarification before starting to use the brake.

Kendrion Binder spring-applied single-disc brake modules type 77 500..B.. are not ready-to-use devices, but are intended to be incorporated into or assembled with other equipment. Consequently, these brakes will be referred to as components in the following sections. The output side of the spring-applied single-disc brake modules has the same fitting dimensions as the motor end shield. As a result, the brakes are designed as fail-safe holding brakes with emergency stop function for attachment to electric motors.

1.2 Standards and directives

The state-of-the-art spring-applied brakes have been designed, built and tested in accordance with the requirements of DIN VDE 0580 concerning electromagnetic devices and components. Being classified as "electromagnetic components", spring-applied single-disc brake modules are not subject to the Low Voltage Directive and must not bear a CE mark of conformity. The user is required to employ suitable switching devices and controls to ensure use of the brakes in accordance with EMC Directive 2004/108/EC.

1.3 Manufacturer's liability

The manufacturer will not assume any responsibility for damage caused by failure to use the products in accordance with their intended use or by failure to observe safety information and other instructions provided in this manual. The information in this manual was correct and up-to-date before going to print. The information contained herein shall not entitle users to raise claims with respect to components purchased at an earlier date.



INDUSTRIAL DRIVE SYSTEMS

1.4 Declaration of Incorporation (in accordance with Annex II, part 1, Section B of Machinery Directive 2006/42/EC)

We hereby declare that the products below comply with the essential health and safety requirements specified in Annex I of Machinery Directive 2006/42/EC:

Annex I General Principles, Annex I Sections 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.5.1

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC. The relevant technical documentation required for the partly completed machinery has been compiled in accordance with Annex VII, part B of Machinery Directive 2006/42/EC. The manufacturer undertakes to submit an electronic copy of the relevant technical documentation compiled for the partly completed machinery if reasonably requested by national authorities.

Standards and directives:

EN 60529 Enclosure protection ratings
DIN VDE 0580 Electromagnetic devices and components

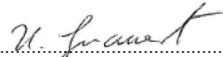
Products: Electromagnetically released spring-applied single-disc brake module
77 50013B16
77 50019B15
77 50024B15
77 50029B15

Manufacturer: Kendrion (Villingen) GmbH
Industrial Drive Systems
Wilhelm-Binder-Straße 4-6
78048 Villingen-Schwenningen
Germany

Person authorized to compile the documentation: Dr Uwe Gnauert
Kendrion (Villingen) GmbH
Industrial Drive Systems
Wilhelm-Binder-Straße 4-6
78048 Villingen-Schwenningen
Germany

Kendrion (Villingen) GmbH
Industrial Drive Systems

Villingen
12 Dec. 2013

Authorized signatory: 
(Dr Uwe Gnauert)
(Head of Development at IDS)



2. Safety

2.1 Safety and warning symbols / Safety information

Personal injury or equipment damage			
Symbol / Signal word	Warns against ...		Potential risks and hazards
	Danger	imminent personal injury	fatal accidents or serious injury
	Warning	potential risk of serious personal injury	fatal accidents or serious injury
	Caution	potential risk of personal injury	minor injury
	Attention	potential risk of equipment damage	damage to components or other equipment
Information			
Symbol / Signal word	Provides information on ...		
	Note	the safe use and operation of the product	

The brakes described in these Operating Instructions have been designed and built on the basis of an analysis of hazards and in accordance with the requirements of the applicable harmonized standards and technical specifications. They correspond to the state of the art and provide maximum safety. However, safety hazards can only be avoided if the user of the equipment takes adequate precautions and makes sure that safety instructions are strictly adhered to. It is the duty of the user of the machine to plan these measures and to check their implementation.

The user is required to ensure that:

- ☒ the brakes are only used in accordance with their intended use (see "Product description" section).
- ☒ the brakes are in perfect working order and checked at regular intervals.
- ☒ a complete copy of these Operating Instructions is kept available at the place of use of the brakes at all times.
- ☒ all applicable local and machinery-specific regulations and requirements are followed.
- ☒ start-up, maintenance and repair work is only done by authorized and suitably qualified personnel.
- ☒ such personnel are kept informed on all relevant occupational safety and environmental protection issues and familiar with these Operating Instructions and with the safety information contained herein.
- ☒ brake functionality is not interfered with by an external magnetic field.

2.2 Intended use

The brake modules described in these Operating Instructions are intended to be assembled with electric machines, in particular electric motors, for use on industrial equipment. Operation in potentially explosive or firedamp atmospheres is not allowed. The brake modules must be used in accordance with the operating requirements detailed in this manual. The rated power limits specified herein must not be exceeded. Use of the brake modules as service brakes or safety brakes is not permitted.



2.3 General safety information

Brakes fitted to motors feature hazardous live components and rotating parts and may exhibit hot surfaces. Any work associated with the transport, connection, start-up and periodical maintenance of the brakes must be carried out by authorized and qualified specialist personnel (in accordance with VDE 0105; IEC 364). Failure to observe safety, operating and maintenance instructions may cause serious personal injury and severe damage to the equipment. Whenever special measures are required in accordance with the instructions contained herein, such measures should be agreed with the brake manufacturer before the machinery into which the brake is to be incorporated is set up.

Should any queries arise with respect to torques, torque variations, installation positions, wear, wear reserve, switching work, break-in conditions, release range, ambient conditions and the like, please contact Kendrion Binder and ask for clarification before using the brake.

Retrofitting or modification work to be carried out on the brake is subject to the approval from Kendrion Binder.

Accident prevention regulations applying to the specific field of application of the brake must be strictly observed.

The brakes described in this manual are not designed for use as "safety brakes". This means that torque reductions by factors beyond the user's control cannot be excluded.

2.3.1 Installation

When connecting the brakes described in these Operating Instructions check that the voltage and voltage type comply with the specifications on the rating plate. Sufficient heat dissipation must be ensured when the brake is fitted to or incorporated into other equipment.

Adequate precautions must be taken to avoid overvoltage during disconnection or voltage peaks. The magnetic field of the products may cause interference outside the brake or even feedback to the brake in case of adverse installation conditions. Should you have queries concerning mounting and fitting conditions, please contact the brake manufacturer and ask for clarification.

Adequate safety measures (DIN VDE 0848, part 4; DIN 31000/VDE 1000; DIN VDE 0100, part 0420) must be taken by the brake user to avoid hazards to persons or damage to equipment caused by:

- ☐ direct or indirect effects of electromagnetic fields,
- ☐ heated components,
- ☐ moving parts.

2.3.2 Start-up

The brakes must not be started up when:

- ☐ power supply cables/wires or connections are damaged.
- ☐ the solenoid housing or coil sheath is damaged.
- ☐ other defects are suspected.

2.3.3 Operation

Make sure that live components such as plug contacts or the field coil are not exposed to water.

The brake cable connections must not be crushed, squeezed or exposed to mechanical loads.

Check that the friction surfaces of the friction elements are not contaminated with grease, oil or other fluids to avoid substantial torque reduction. Bear in mind that the original torque cannot be restored even if the friction surfaces are cleaned after contact with fluids.

The gradual brake wear towards the end of the brake service life may cause an approximately 10% torque reduction. This must be taken into consideration in the set-up of the machine or overall system.

Due to the diverse ambient conditions in which the brakes may be used, always check that the brake module is in perfect working order before start-up.

Torque reductions cannot be excluded if the brake module is used for applications where only minimum friction work is required. In such cases, the user should ensure that the brake occasionally performs sufficient friction work.

**Note!**

The maximum air gap s_{max} (see Table 28/1: air gap s_{nom} and s_{max}) must not be exceeded throughout the entire brake module service life. (Please refer to Section 6 "Maintenance" for details.)

2.3.4 Maintenance and repair

Repair work must only be carried out by qualified specialist personnel (definition to IEC 364). Failure to perform repairs according to requirements may cause serious personal injury or equipment damage. Make sure that no voltage is applied to the brakes when carrying out maintenance work.

3. Emissions**3.1 Noise**

The spring-applied single-disc brake module produces switching noise during engagement and release. The noise level is determined by the installation conditions, circuitry and air gap. Depending on the mounting position, operating conditions and state of the friction surfaces, audible vibrations (squealing) may be produced during braking.

3.2 Heat

Braking operations and gradual heating of the field coil cause the solenoid housing temperature to increase substantially. Under adverse conditions, the surface temperature may rise to well over 100°C.

**Caution!**

Risk of burns in case of contact with hot surfaces! Suitable covers and hand guards must be installed to provide protection against accidental contact.

3.3 Electromagnetic compatibility

As required by the German Electromagnetic Compatibility Act (EMVG), electromagnetic compatibility must be guaranteed to ensure immunity to external electromagnetic fields and conducted interference.

Furthermore, the emission of electromagnetic fields and line-conducted interference during brake operation must be minimized. Since the brake features depend on the circuitry and operation, a declaration of conformity with the applicable EMC standard can only be furnished for the wiring type, but not for a specific brake.

The spring-applied single-disc brake modules type 77 500..B.. are designed for industrial applications to which the following EMC standards apply: Generic Immunity Standard EN 61000-6-2 and Generic Emission Standard EN 61000-6-3 / EN 61000-6-4.

Other applications may be subject to different generic standards which must be considered by the manufacturer of the overall system. The requirements in terms of electromagnetic compatibility of devices and components are determined by basic standards derived from the generic standards. Brake wiring recommendations will be provided in the following sections to ensure compliance with the individual basic standards that are relevant for industrial use of the brake and some other applications.

For additional information on electromagnetic compatibility, especially with respect to the recommended electronic rectifiers specified in Section 5.3, please refer to the applicable data sheets.



INDUSTRIAL DRIVE SYSTEMS

Immunity according to EN 61000-4:**EN 61000-4-2 Electrostatic discharge:**

The spring-applied single-disc brake modules comply at least with severity level 3 without requiring additional measures. The recommended rectifiers specified in Section 5.3 conform to severity level 3 without additional measures.

EN 61000-4-3 Electromagnetic fields:

The spring-applied single-disc brake modules comply at least with severity level 3 without requiring additional measures. The recommended rectifiers conform to severity level 3 without additional measures.

EN 61000-4-4 Fast transients (burst):

The spring-applied single-disc brake modules comply at least with severity level 3 without requiring additional measures. The recommended rectifiers conform to severity level 3.

EN 61000-4-5 Surge:

The spring-applied single-disc brake modules comply at least with severity level 3 without requiring additional measures. The recommended rectifiers conform to severity level 3.

EN 61000-4-9 Pulse magnetic fields, EN 61000-4-10 Damped oscillatory magnetic fields:

Since the operating magnetic fields of the electromagnetic brakes are stronger many times over than interference fields, the brake function will remain unaffected. The spring-applied single-disc brake modules comply at least with severity level 4. The recommended rectifiers conform at least to severity level 3.

EN 61000-4-11 Voltage dips, short interruptions, and short supply voltage variations:**a) Voltage interruptions:**

Spring-applied single-disc brake modules that comply with the requirements of DIN VDE 0580 are de-energized after the specified switching times at the latest. The switching time depends on the control and mains conditions (e.g. generator effect of running down motors). Voltage interruptions of shorter duration than the response delay specified by DIN VDE 0580 will not cause any malfunctions. The user must ensure that any consequential damage is avoided (e.g. motor start-up before the brake has been released caused by phase failure in the case of two-phase energized motors or by the slipping of an electromagnetically engaged system due to torque drop). The functional reliability of the electromagnetic brake and its electronic accessories remains unaffected provided that the aforementioned consequential damage is avoided.

b) Voltage dips and short supply voltage variations:**Electromagnetically released systems:**

Voltage dips and supply voltage variations to below 60% of the rated voltage and lasting longer than the response delay specified by DIN VDE 0580 may cause the brake to be de-energized temporarily. Consequential damage as described under a) above must be avoided by the user by taking adequate precautions.

Electromagnetically engaged systems:

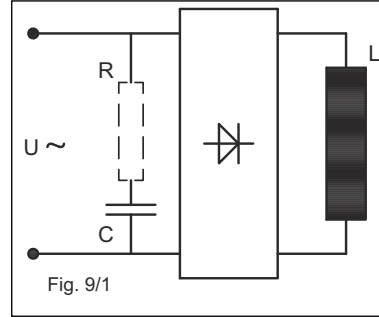
Voltage dips and supply voltage variations to below the minimum tolerance threshold will cause torque reductions. The user is required to take adequate precautions to avoid consequential damage.

**Radio interference suppression in accordance with EN 55011:**

The brake modules and the recommended electronic rectifiers are classified as Group 1 equipment in accordance with EN 55011. As far as the emissions from this equipment are concerned, one distinguishes between field guided radiated interference and line-conducted interference.

- a) Radiated interference:
When operated with DC voltage or rectified 50/60 Hz AC voltage, all brakes comply with the limit values applicable to Class B equipment.

- b) Conducted interference:
When connected to a DC power source, the electromagnetic brakes meet the limit values applicable to Class A equipment. If the brakes are connected to a 50/60 Hz AC power source and equipped with electronic rectifiers or other electronic controls, interference suppression measures as shown in Fig. 9/1 must be taken to ensure compliance with the limit values applicable to Class A equipment.



Interference suppression capacitors should be used which must be dimensioned to suit the connection data of the electromagnetic components and the specific mains conditions. The recommended rectifiers specified in Section 5.3 are CE mark certified in accordance with the EMC Directive. They have built-in interference suppression components and comply at least with the requirements of EN 55011 for Class A equipment, unless otherwise specified in the specification sheets. When brakes are used with the specified rectifiers or with other types of rectifiers, the recommended values listed in Table 9/1 should be observed.

Interference suppression components should be installed as close as possible to the consumer. Interference caused during switching operations of the electromagnetic component is generally attributable to the inductive load.

Where necessary, assemblies designed to limit the disconnection voltage (e.g. anti-parallel diode) or voltage limiting components (e.g. varistors, suppressor diodes, resistance diodes and the like) can be installed. However, such components will inevitably change the switching times of the brake and increase the generated noise level. The rectifiers specified in Section 5.3 are equipped with free-wheel diodes and/or varistors to limit the disconnection voltage.

In case of DC side switching, a varistor rated for the type-specific maximum operating voltage and connected in parallel with the field coil (1.2) limits the peak voltage to the values specified in Table 9/2.

**Note!**

If the brake is used in connection with other electronic accessories, the user is responsible to ensure compliance with EMC requirements. Compliance with applicable standards concerning the design and operation of components, sub-assemblies or equipment employed shall not relieve the user and manufacturer of the overall system from their obligation to furnish proof of conformity of the overall system with such standards.

Rectifier type	Rated input voltage range U_1/VAC (40-60 Hz)	DC at L-load (ADC)	Capacitor (nF/VAC)
Half-wave rectifier 32 07332B40	up to 500 (±10%)	up to 2.0	no additional interference suppression measures required

Table 9/1

Max. rectifier operating voltage (VAC)	Recommended disconnection voltage for DC side switching (V)
250	700

Table 9/2



4. Product description

4.1 Operating principle

The brake module is an electromagnetic component with built-in electromagnetically released spring-applied single-disc brake designed to operate dry. The braking effect is produced by the spring force and neutralized electromagnetically. The brake module with ball bearing supported brake shaft should preferably be mounted to the A-face end shield of electric motors. The brake can also be equipped with an optional hand release so that it can be released manually.

4.2 Design

The solenoid housing (1.1) with the encapsulated field coil (1.2) accommodates the armature (2), friction disc (4) and flange (3). The flange is fixed by means of the cheese head screws (10). The compression springs (7) located in the solenoid housing (1.1) are supported on the adjusting ring (9) and solenoid housing (1.1) by the studs (8) (size 13 brakes: compression springs (7) only). These compression springs generate an axial force that is transmitted to the friction disc (4) through the armature (2). As a result, the friction disc (4) is clamped between the firmly fixed flange (3) and the armature (2) and the braking effect (torque) is produced. Straight pins (5) are provided which act as tangential torque supports for the armature (2) relative to the solenoid housing (1.1).

When DC voltage is applied to the field coil (1.2), the electromagnetic force thus generated causes the armature (2) to be attracted, overcoming the force of the compression springs (7). The friction disc (4) is thus released and the braking effect is neutralized.

As the brake module is a closed system, no forces are transmitted outwards away from the brake. Transmission of the braking force from the axially moveable friction disc (4) to the brake shaft (13) is achieved through the form-fit connection of the square socket in the friction disc with the brake shaft (13), with the brake shaft being rigidly connected with the motor shaft. This applies to size 13, 19 and 24 brakes. When a size 29 brake is used, the friction disc is connected with the brake shaft by means of the teeth provided on the disc and shaft. The ball bearing (15) located between the solenoid housing (1.1) and brake shaft (13) ensures that the brake can be centred relative to the brake shaft (13) and motor shaft when it is mounted to the motor flange. The bearing also absorbs transverse forces that act radially on the brake shaft (13). The ball bearing is factory-sealed.

An additional sealing ring (6) is provided which protects the friction disc (4) against dirt, grease or oil ingress in case the factory-installed ball bearing sealing rings are damaged and ensures that abrasive grit and dust produced by the friction disc cannot escape.

On the drive side, the flange (3) and brake shaft (13) are sealed by the sealing ring (11). The optional hand release (24) allows the spring-applied single-disc brake module to be released manually (e.g. in case of power failure). The brake must be connected directly to the terminals in the connector box (19).

The transmissible torque of the brake module can be changed with the adjusting ring (9). Rubber bolts (18) and an O-ring (26) are provided to reduce the noise and vibration produced by the friction disc (4).

Key to Fig. 11/1:

1.1	Solenoid housing	15	Ball bearing
1.2	Field coil	16	Circlip
2	Armature	17	Screw plug ¹⁾
3	Flange	18	Rubber bolt ²⁾
4	Friction disc	19	Connector box
5	Straight pin	20	Feather key
6	Sealing ring		
7	Compression spring	22	Sealing washer
8	Stud (not used in size 13 brakes)	23	Cover (2 x arranged at 180°) ³⁾
9	Adjusting ring (not used in size 13 brakes)	24	Hand release (accessories)
10	Cheese head screw	25	Set screw ¹⁾
11	Sealing ring	26	O-ring ⁴⁾
12	Disc	E	Adjusting ring clearance
13	Brake shaft	A	Contact surface motor side
14	Spring washer	B	Contact surface brake shaft (13)

¹⁾ bonded with Loctite 243; installed in brake shaft (13)

²⁾ accessories for size 19 and 24 brakes; included as standard parts of friction disc (4) in size 13 brakes

³⁾ only used in brakes without hand release (24)

⁴⁾ only in size 29 brakes

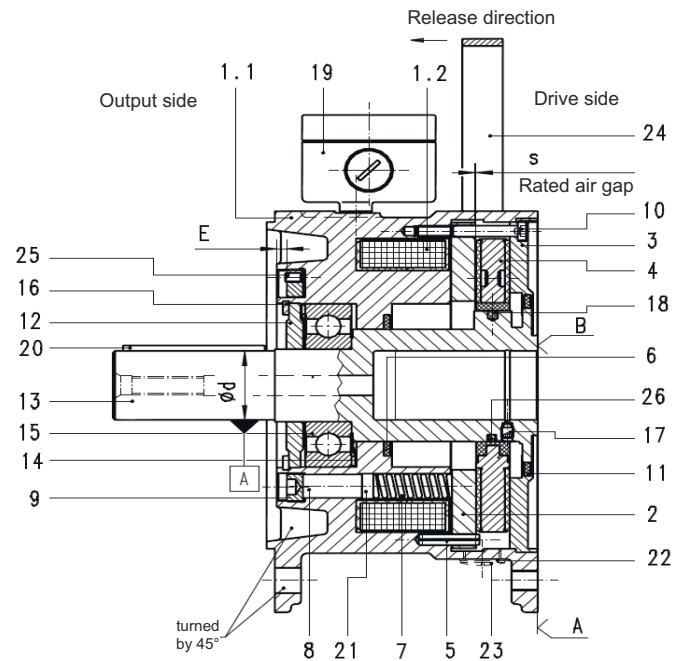


Fig. 11/1: Spring-applied single-disc brake module 77 500..B15

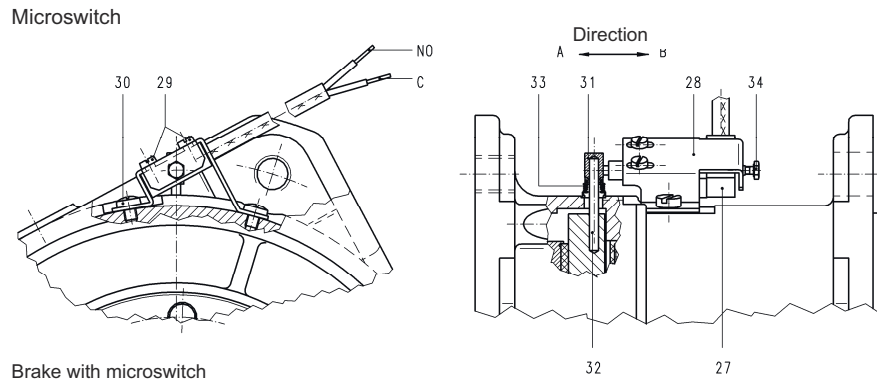


Fig. 11/2: Microswitch installation on spring-applied single-disc brake module 77 500..B15

**Key to Fig. 11/2:**

27	Microswitch	31	Stud
28	Strap	32	Straight pin
29	Cheese head screw (2x)	33	Bellows
30	Oval head screw (2x)	34	Hexagon head cap screw M2.5x8 (not supplied)

5. Installation**Attention!**

Every time the spring-applied single-disc brake module is reassembled, the fixing screws and cheese head screws (10) must be tightened to the M_A tightening torques specified in Table 13/1 and Table 22/1. The adjusting ring (9) must be secured with the set screw (25) (tightening torque $M_A = 3 \text{ Nm}$). Loctite 243 must be applied to the set screw (25). When maintenance work is carried out on the connector box (19) (see Section 5.3), the cheese head screws (19.3) must be tightened to $M_A = 1.6 \text{ Nm}$ when installing the cover (19.1) with the connector box (19). Damage to the seal between the connector box (19) and cover (19.1) must be avoided.

5.1 Mechanical installation**5.1.1 Brake shaft (13) installation**

The press-fit connection of the brake shaft (13) with the motor shaft provides reliable transmission of the brake torque. An additional form-fit connection in the form of a feather key, for example, is not allowed. The motor shaft must not have a feather key groove.

**Attention!**

The fits and surface roughness required for the motor shaft must be chosen by the brake user according to the adjusted transmissible brake torque and must be suitable to ensure reliable transmission of the generated brake torques.

- Before heating the brake shaft (13), make sure that both the brake shaft (13) and the motor shaft end are dry and free from grease and that the following parts have been removed:
screw plug (17) – any brake size,
rubber bolts (18) (accessories) – sizes 19 + 24,
O-ring (26) (accessories) – size 29.
- Check the position of the motor shaft contact shoulder relative to the contact surface of the brake on the motor flange and correct it by installing shim rings, if necessary. The permitted tolerance is $\pm 0.5 \text{ mm}$.
- Before mounting the brake shaft (13), check the radial runout on the motor shaft end and mark the maximum runout angle on the front face of the motor shaft.
- After completion of the above operations, the brake shaft (13) must be evenly heated in an electric oven or by means of an inductive heating system until it has reached a temperature of 280°C to 300°C . Once heated, the brake shaft (13) must be slipped onto the motor shaft end until it touches the contact shoulder and secured in axial direction until it has cooled down. Make sure that the brake shaft (13) is mounted in such a way that the radial runout mark is offset by 180° relative to the runout mark on the motor shaft.
- After the brake shaft has cooled down, screw the screw plug (17) into the brake shaft (13) and secure it with Loctite type 222. This applies to all brake sizes.
- When rubber bolts (18) are used (size 19 and 24 brakes), insert the bolts (18) into the bores provided in the brake shaft (13) (see Fig. 11/1) after the shaft has cooled down.
- When using a size 29 brake, insert the O-ring (26) into the groove in the brake shaft (13) (see Fig. 11/1).
- If rubber bolts (18) (size 19 + 24 brakes) or an O-ring (26) (size 29 brakes) are used, check that they are correctly positioned (rubber bolts (18): rounded end pointing outwards in the bores of the brake shaft (13) square socket; O-ring (26): located in the groove near the brake shaft teeth).
- During brake mounting, apply talc to the projecting surface of the rubber bolts (18) or O-ring (26) to reduce slip-on forces.



5.1.2 Mounting the brake module to the motor



Attention!

The friction surfaces of the friction disc (4), the guide surfaces of the square socket (size 13, 19, 24 brakes) or the teeth of the friction disc (4) (size 29 brakes) must be free from grease or oil. Do not use any lubricant to improve the axial guide properties of the friction disc (4) and make sure to avoid damage to the sealing rings (6 and 11).

1. Mount the brake module in vertical position with the motor shaft pointing upwards.
2. Close the oil supply bore in the brake shaft (13) with the screw plug (17). Apply Loctite 222.
3. Mount the brake module to the motor by slipping it onto the brake shaft (13) until it makes contact with the motor flange. Ensure that the brake is parallel to the motor shaft and that a form-fit connection is established between the brake shaft (13) and the square socket (size 13, 19, 24 brakes) or with the internal teeth (size 29 brakes) of the friction disc (4).
4. The friction disc (4) is factory-centred in the spring-applied single-disc brake module to ensure easy installation.
5. Slightly tighten the fixing screws after having taken the preliminary assembly steps described above. Ensure that the brake is released electromagnetically after the spring-applied single-disc brake module has been connected (see Section 5.3).
6. Manual brake release by means of an attached hand release (24), for example, is not allowed. To complete brake mounting, use the ball bearing set (accessories).
7. The spring washers (14) must be placed into the solenoid housing (1.1) as shown in Fig. 11/1. Size 13 and 19 brakes require only one spring washer each, whereas size 24 and 29 brakes must be equipped with two spring washers.



Attention!

The brake shaft and ball bearing must not be exposed to any axial shocks. The disc (12) is essential to the correct operation of the brake module and must only be replaced by an original spare part.

8. In order to install the ball bearing (15), pressure must be evenly applied both to the inner and outer rings of the bearing (15) to force it onto the motor shaft until it touches the shaft shoulder of the brake shaft (13). The necessary pressure is generated through a mounting sleeve and the thread provided at the front end of the brake shaft (13).
9. The solenoid housing (1.1) is thus centred through the ball bearing. Proceed to install the disc (12) and circlip (16).



Attention!

The M_A tightening torque (Table 13/1) specified for the fixing screws must be strictly observed. The screws must be tightened evenly in diametrically opposite sequence.

10. Tighten the fixing screws to the M_A tightening torques specified in Table 13/1.

	Size			
	13	19	24	29
M_A tightening torque (fixing screws) [Nm]	42	70	165	165

Table 13/1: M_A tightening torques for fixing screws



5.2 Installation of accessories (not applicable to the brake shaft (13))

Hand release (24) (only applicable to retrofitted hand release):

1. Remove the two covers (23) located opposite each other on the circumference of the solenoid housing (1.1) (see Fig. 14/1).
2. Screw the cams (24.1) with the threaded bush into the bores of the covers (23), making sure they are correctly positioned (see figure to the right). Apply Loctite 243 to secure the cams.
3. Insert the hand release lever (24.2) into the square socket provided in the cams (24.1). The hand release can be operated by pushing the lever (24.2) in one direction (see Fig. 14/1).
4. The mechanical release forces F required to release the brake and the maximum permitted release forces (actuation forces) $F_{\max}$ are specified in Table 14/1. The release forces F are based on the highest transmissible (standard) torque (see "Technical specifications").

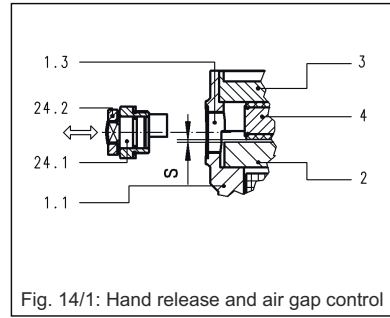


Fig. 14/1: Hand release and air gap control

Key to Fig. 14/1:

1.1	Solenoid housing	4	Friction disc
1.3	Bore for air gap measurement	24.1	Cam (complete)
2	Armature	24.2	Hand release lever
3	Flange	s	Air gap

	Size			
	13	19	24	29
Threaded bush tightening torque M_A [Nm]	20	26	35	35
Release force F [Nm]	80	130	200	240
Max. permitted release force (actuation force) $F_{\max}$ [N]	120	180	280	330

Table 14/1: Release force F , max. permitted release force (actuation force) $F_{\max}$ of hand release (24), M_A tightening torque of threaded bush of cams (24.1)



Warning!

Check that the mechanical hand release (24) is in a central position (see Fig. 11/1) when not in use. This is crucial to ensure reliable brake engagement. Otherwise, the full braking effect of the spring-applied single-disc brake module may not be reached. In this case, the machine (e.g. motor) must be stopped immediately and must not be restarted until correct operation of the hand release (24) and automatic return of the hand release lever in its central position (see Fig. 11/1) has been ensured.



Caution!

The brake torque can be neutralized manually by means of an attached hand release (24). Consequently, the brake must be mounted in such a way that any unintentional actuation of the hand release (24), e.g. by removing the hand release lever, is excluded.



Note!

Machinery-specific regulations and requirements (e.g. for hoists, cranes and elevators) must be observed when using brakes with hand release (24).



Ball bearing set (ball bearing (15), spring washer (14), circlip (16)):

The ball bearing set is required as a second bearing for the motor shaft. The complete ball bearing set must be installed as described in Section 5.1.1.

Rubber bolts (18) (size 19 and 24 brakes), O-ring (26) (size 29 brakes):

To reduce the noise produced by the brake module during operation, rubber bolts (18) (size 19 and 24 brakes) or an O-ring (26) (size 29 brakes) can be installed in the brake shaft (13) as described in Section 5.1.1.

5.3 Electrical connection and operation



Warning!

The brake module is a DC operated system. Permanent voltage variations on the power source of the electromagnetic brake must be limited to $\pm 10\%$ of the rated voltage.

The following checks must be carried out when connecting the brake:

- ☑ Check that the connecting cables are suitable for the intended use and for the voltage and amperage of the brake.
- ☑ Check that the connecting cables are secured with screws, clamps or other suitable fixtures to avoid interruptions in the power supply.
- ☑ Check that the connecting cables are long enough for the intended use and that suitable torsion, strain and shear relief features as well as bending protections are provided.
- ☑ Check that the PE conductor (only for protection class I) is connected to the earthing point.
- ☑ Check that no foreign matter, dirt or humidity is trapped inside the terminal box.
- ☑ Check that unused cable entries and the terminal box are suitably sealed to ensure compliance with the protection class requirements to EN 60529.

The spring-applied single-disc brake module must be supplied with DC voltage.

Connection to an AC power source is via a half-wave rectifier (19.2). Brakes equipped with a built-in rectifier (19.2) can be connected directly to the AC power source. The contact assignment is shown in Fig. 16/1.

Brakes equipped with connecting terminal (19.2) must be connected directly to DC voltage. The customer-specific connecting cable must be connected to the terminal (19.2) or built-in rectifier (19.2) by means of a cable gland (M16x1.5 for cross-sections of between 5 and 10 mm).

Remove the cover (19.1) of the connector box (19) so that the individual strands of the connecting cable can be connected to the terminal (19.2) or to the contacts of the built-in rectifier (19.2).

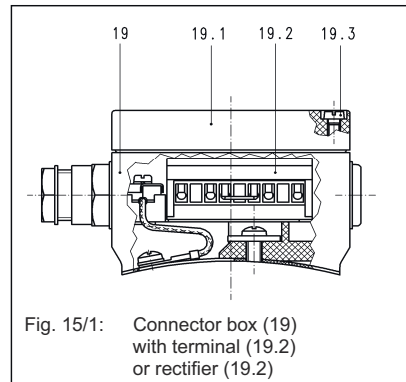


Fig. 15/1: Connector box (19) with terminal (19.2) or rectifier (19.2)



INDUSTRIAL DRIVE SYSTEMS

Rectifier series	Rectifier type	Rated input voltage range U_1/VAC (40-60 Hz)	Output voltage U_2/VDC	Max. output current R-load I/ADC	L-load I/ADC
32 07332B40	half-wave	0-500 (±10%)	$U_1 \times 0.445$	1.6	2.0
Specific rectifier specification sheets must be observed!					

Table 16/1: Rectifier for single-phase AC voltage supply via connecting terminal (19.2)

**Attention!**

When installing the cover (19.1) and connector box (19), the cheese head screws (19.3) must be tightened to $M_A = 1.6 \text{ Nm}$. Damage to the seal between the connector box (19) and cover (19.1) must be avoided.

Brakes equipped with built-in rectifiers (19.2) use half-wave rectification.

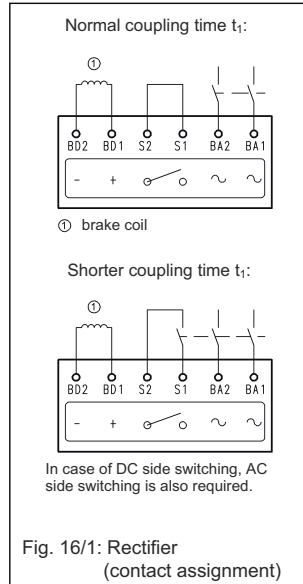
The built-in rectifier (19.2) can be wired in such a way that AC side switching (normal coupling time t_1) or DC side switching (short coupling time t_2) is possible (see Fig. 16/1).

Depending on the brake size and torque, voltage ripple due to intermittent power supply may cause brake humming or incorrect brake operation.

Perfect brake operation must be ensured by the user or system manufacturer by providing suitable electrical controls.

Attention!

When connecting the rectifier (19.2), the terminals must be tightened to a tightening torque of $M_A = 0.4 \text{ Nm}$.





5.3.1 DC power supply

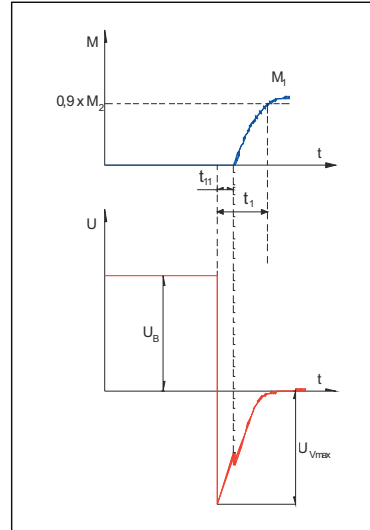
The figure to the right shows the voltage curve after the field coil (1.2) has been de-energized.



Attention!

The peak voltage U_{Vmax} during disconnection without protective circuit may reach **several thousand V** in the millisecond region. This may cause irreversible damage to the field coil (1.2), switching contacts and electronic components. Sparking will occur on the switch during disconnection. Consequently, a protective circuit must be provided to reduce the current during disconnection and to limit the voltage. The maximum permitted overvoltage during disconnection is 1500 V.

If Kendrion Binder rectifiers are used (see Table 16/1), the protective circuit required for the built-in electronic components and field coil (1.2) is included in the rectifier and limits the disconnection voltage to approx. 300 V. This also applies to contacts S1 and S2 (DC side disconnection).



U_B operating voltage (coil voltage)
 U_{Vmax} disconnection voltage



Attention!

In case of DC side switching and connection to a DC power source, the brake must be operated with a protective circuit to avoid overvoltage. Additional protective elements (e.g. varistors, spark arresters, etc.) must be installed to avoid damage such as burns or fusing of contacts.



Attention!

Sensitive electronic components (e.g. logical components) may also be damaged by the lower voltage.

5.3.2 AC power supply



Warning!

Work on the brake must only be carried out by qualified specialist personnel. Make sure that no voltage is applied during brake connection. The specifications on the rating plate and the information provided in the circuit diagram in the terminal box or in the Operating Instructions must be strictly observed.

Direct connection of the spring-applied single-disc brake to an AC power source is only possible if a rectifier is used. The coupling times vary depending on the switching type (DC side switching or AC side switching) (see Section 5.3).

Half-wave rectification:

In case of half-wave rectification, the U_2 coil voltage is lower by factor 0.445 than the rectifier input voltage. Half-wave rectifiers produce voltage with high residual ripple which, depending on the brake size, may slightly reduce the switching times when compared to bridge rectifiers. Due to the shorter switching times and the lower coil voltage, half-wave rectifiers are generally preferred to bridge rectifiers. However, brake humming may occur when small size brakes are used.

DC side switching:

In case of DC side brake switching, an auxiliary contact is provided on the motor contactor, for example. This auxiliary contact is designed to interrupt the power supply on the DC side.

5.3.3 Electrical connection of brake modules with microswitch (27)**Note!**

Machinery-specific regulations and requirements (e.g. for hoists, cranes and elevators) must be observed when using brakes with microswitches (27).

When the brake is used for applications during which a load torque is generated, the system user is responsible to ensure correct and safe wiring of the microswitch (27) and brake module.

**Warning!**

The motor circuit must be protected in such a way that no accidental motor start-up can occur when the microswitch (27) contact closes.

If brakes are equipped with a microswitch (27) to control the release status (released/engaged) of the spring-applied single-disc brake module, the microswitch (27) must be tied into the control circuit of the machine (e.g. motor). This is crucial to ensure that the microswitch (27) prevents start-up of the machine (e.g. motor) before the spring-applied single-disc brake module has been released. The optional microswitch (27) must be ordered together with the brake as it cannot be retrofitted to the brake at a later date. The microswitch (27) is factory-adjusted prior to shipment of the brake module.

5.4 Set-up and start-up**Warning!**

The functional check of the brake must not be performed unless the machine (e.g. motor) has been switched off (disconnected) and secured against accidental or unintentional start-up.

**Attention!**

When using machines (e.g. motors) with vertically upward directed shaft end, any ingress of fluids (water or cooling lubricant) into the ball bearing (15) of the brake module must be avoided. The brake module must be mounted in such a way that sufficient heat dissipation is ensured.

**Attention!**

Check that the brake has been connected in accordance with the specifications provided on the rating plate before it is started. Even short-term operation outside the specified supply voltage limits may cause irreversible damage to the brake or electronic accessories. Such damage may not be apparent immediately. DC side brake switching without protective circuit as described in Section 3.3 will cause damage to electronic rectifiers, electronic accessories, switching contacts and to the field coil (1.2).

**Warning!**

Before starting the machine (e.g. motor) test run without driven components, the feather key (if used) must be secured in such a way that it cannot be hurled out. The shaft must not be exposed to load torques. Before the machine (e.g. motor) is re-started, the brake must be de-energized.

**Caution!**

The brake surface temperature may rise to over 100°C. Heat-sensitive parts such as conventional cables or electronic components must not be fixed to or be in contact with these surfaces. If necessary, suitable protections and hand guards must be installed to avoid accidental contact with hot surfaces!

**Attention!**

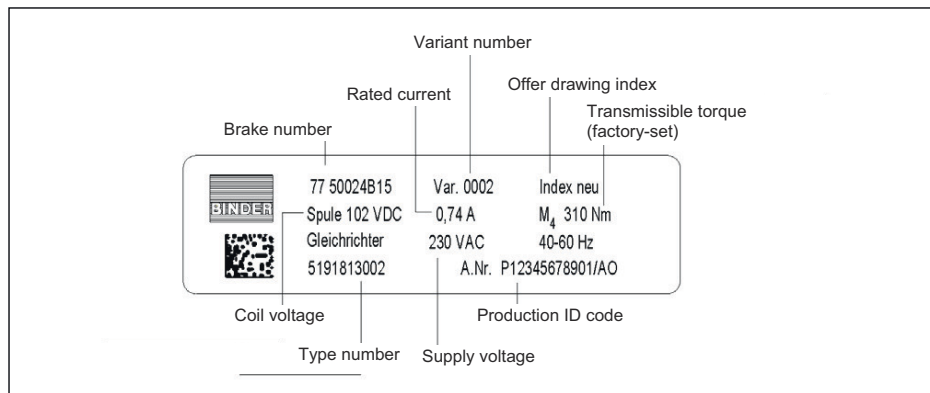
High-voltage tests performed during brake mounting within an overall system or during start-up must be carried out in such a way that damage to the built-in electronic accessories is avoided. The limits for high-voltage tests and follow-up tests specified by DIN VDE 0580 must be observed.

The following checks must be carried out:

- ☑ Check compliance with the specifications provided on the rating plate with respect to the mounting position and protection class.
- ☑ Ensure that power is supplied separately to the spring-applied single-disc brake module (and not to the motor) and turn the motor shaft while the brake is released to check that the friction disc (4) and brake shaft (13) move smoothly. Proceed to perform a functional test of the axial armature movement.
- ☑ Check that the axial and radial runout is within the tolerance range specified in EN 50347-N.
- ☑ Information on ball bearing break-in conditions, bearing lubrication intervals etc. is provided in the specification sheets of the bearing manufacturers and in the motor manual.

After completion of mounting, all necessary covers and guards must be installed.

Specifications on rating plates (example):

**5.4.1 Manual brake release****Warning!**

Extreme caution is advised during manual release (jog mode) of the spring-applied single-disc brake module (e.g. for maintenance work on the machine (e.g. motor) or in case of failure of the regular power supply and use of a UPS system). If the drive system is unbalanced, the load torque may accelerate the drive. The brake user is required to take adequate precautions to ensure that no hazardous situations are caused by the load torque when the brake module is released and engaged in jog mode.



The spring-applied single-disc brake module can be released "manually" by means of a mechanical hand release (24) (accessories). In case of failure of the regular power supply, it is also possible to use a commercial UPS (e.g. UPS battery system) for the electrical release of the brake module. For this purpose, the brake user is required to install a UPS system that complies with the voltage specifications given on the brake module rating plate.

5.5 M_4 transmissible torque adjustments



Attention!

When adjusting the adjusting ring (9) on the basis of the values given in the offer drawing, make absolutely sure that the M_4 transmissible torque is not below the minimum torque required.

The changed adjusting ring clearance "E" must be marked on the bottom of the solenoid housing. The adjusted theoretical M_4 transmissible torque must be entered in the blank field provided on the rating plate of the brake module (see rating plate example).

After adjustment of the M_4 transmissible torque, the brake user is required to ensure that the adjusting ring (9) is secured with the set screw (25), applying a tightening torque of $M_A = 3 \text{ Nm}$.

The adjusting ring (9) must be turned in such a way that the set screw (25) can be located between the studs (8). The M_4 torque tolerance is $\pm 15\%$.

1. The brake modules are factory-adjusted to the standard M_4 transmissible torque specified in the specification sheet. The M_4 transmissible torque applicable at the time of shipment is specified on the rating plate.
2. The torque can be adjusted by means of the adjusting ring (9). After completion of adjustment, the ring must be locked by means of the set screw (25). The adjusting ring clearance "E" (see Fig. 11/1) is marked on the bottom of the solenoid housing near the set screw (25). After having loosened the set screw (25), the M_4 standard torque can be changed by changing the adjusting ring clearance "E" by means of a pin spanner.
3. After having changed the torque, the new adjusting ring clearance "E" must be marked on the solenoid housing. The adjusting ring must be locked by means of the set screw (25), making sure, however, that the set screw is not within the reach of the studs (8).
4. Secure the set screw (25) with Loctite 243, for example.
5. While torque variations only have a minor impact on coupling times t_1 , the disconnection time t_2 is reduced proportionally to the torque reduction.

	Size		
	19	24	29
Transmissible torque change $\Delta M_4/\text{mm}$ [%]	approx. 15	approx. 12	approx. 14
M_4 transmissible torque (standard value) [Nm]	150	310	500
Maximum transmissible torque $M_{4 \text{ max.}}$	150	310	500

Table 20/1: Change in the M_4 transmissible torque [%] from 1 mm axial adjustment of the adjusting ring (9); M_4 transmissible torque (standard value) and maximum transmissible torque $M_{4 \text{ max.}}$

Note: Torque adjustments are not possible for size 13 brakes.



6. Maintenance



Warning!

Whenever carrying out inspection and maintenance work, ensure that

- ☒ the machine (e.g. motor) is secured against accidental or unintentional start-up.
- ☒ no load torque acts on the shaft.
- ☒ the lock provided to prevent accidental start-up of the machine (e.g. motor) is removed after completion of inspection and maintenance work.
- ☒ all friction surfaces are free from grease and oil. An oily or greasy friction disc (4) cannot be cleaned.
- ☒ no swelling of the friction lining has occurred (to be checked by air gap measurement).
- ☒ no hardening (glazing) of the friction lining has occurred (only visible when the brake is released).
- ☒ the brake module has been switched off and disconnected from the power supply.

6.1 Checks and service



Attention!

Depending on its operating condition, it may no longer be possible to release the spring-applied single-disc brake when the maximum air gap s_{max} (see Table 28/1: air gap s_{nom} and s_{max}) has been exceeded. In this case, the braking effect cannot be neutralized. This may cause thermal overloading of and irreversible damage to the brake module if the machine (e.g. motor) is started before the brake has been released. Thermal overloading of the machine (e.g. motor) may occur if the machine (e.g. motor) is not started while the brake is still engaged.

1. The spring-applied single-disc brake module does not require any particular maintenance except that the air gap 's' (see Table 28/1: air gap s_{nom} and s_{max}) and the degree of wear of the friction disc (4) must be measured at regular intervals.
2. For this purpose, the brake must be released electromagnetically during motor standstill to allow the air gap 's' between the armature (2) and friction disc (4) to be measured through the threaded bore (1.3) by means of a feeler gauge. The air gap can only be measured after having removed the cover (23) or – when using brakes with hand release – after having removed the hand release lever (24.2) and complete cam assembly (24.1) (see Fig. 14/1).
3. If the maximum air gap s_{max} (see Table 28/1) is reached the friction disc (4) must be replaced to ensure functional reliability and safety of the brake. When replacing the friction disc (4), check the friction surfaces of the armature (2) and flange (3). It is not possible to perform adjustments (air gap adjustments) to compensate for wear.
4. If the ball bearing (15) (accessories) needs to be replaced, make sure to use bearings of the same type or of identical design.
5. The sealing rings (6 and 11) do not require any maintenance. However, they should be replaced every time the brake unit is opened.
6. The new sealing rings (6 and 11) must be glued in place after having cleaned the contact surfaces. To this end, Loctite 480 or an equivalent adhesive must be applied to individual spots on the front face of the solenoid housing (1.1) and on the circumference of the flange (3) before the sealing rings (6 and 11) are inserted and pressed on.



6.2 Brake module removal from motor and replacement of component parts

The following instructions must be strictly followed when replacing individual brake components:

- ☒ Centre the friction disc (4) relative to the centre of the brake module.
 - ☒ Adjust the microswitch (27) when using brakes equipped with microswitch.
 - ☒ Ensure that the friction disc is free from grease and oil.
 - ☒ Adjust the required clearance "E" of the adjusting ring (9) (see marking on bottom of solenoid housing).
 - ☒ Tighten the cheese head screws (10) in the flange (3) to the tightening torques specified in Table 22/1.
 - ☒ Before removing the brake module from the motor, cautiously remove all components still fitted to the brake shaft (13), such as gear, feather key, etc. Loosen the fixing screws to allow the brake to be removed.
1. After having removed the fixing screws, the brake module can be pulled off the motor shaft by means of a withdrawal device. This device must be applied to the fixing corners on the output side flange of the solenoid housing (1.1) and supported on the front face of the brake shaft (13).
 2. To avoid damage to the centring bore in the brake shaft (13), a shim ring can be inserted under the withdrawal device.



Note!

Substantial forces may have to be applied as the ball bearing (15) needs to be pulled off together with the brake module. Extreme caution is advised during these operations. If the brake module is in a horizontal position when removing it from the motor shaft, the brake must be supported in radial direction. Ball bearings (15) must not be reused after removal, regardless of their service life.

1. If individual components of the brake module need to be replaced, loosen the set screw (25) and unscrew the adjusting ring (9) to unload the compression springs (7).
2. Unscrew the cheese head screws (10) so that the flange (3) and all other components can be removed.
3. Use only grease-free cleaning agents to clean the brake components, when necessary. Bear in mind that the friction disc (4) cannot be cleaned. When using brakes equipped with microswitch (27), the armature (2) can only be removed after having taken off the stud (31) and the straight pin (32). Used studs (31) and straight pins (32) must be replaced by new parts after the brake module has been reassembled.

Installation of the brake module must be carried out in reverse order of removal.

	Size			
	13	19	24	29
M _A tightening torques of cheese head screws (10) of flange (3)	5	9	14	22

Table 22/1: M_A tightening torques of cheese head screws (10) for flange (3)



6.3 Microswitch (27) adjustment (only applicable to brake modules with microswitch (27))



Warning!

The motor circuit must be protected in such a way that no accidental motor start-up can occur when the microswitch (27) contact closes. The cheese head screws (29) must be tightened to the specified M_A tightening torques.

When using brake modules equipped with a microswitch (27), the microswitch may need to be adjusted during maintenance and service work.

1. The microswitch can only be adjusted after the brake has been released electrically and the cheese head screws (29) have been slightly loosened. Check whether the microswitch status is "open" or "closed" by using a continuity tester connected to "NO" and "C" (see Fig. 11/2).
2. When "closed", push the microswitch (27) back beyond the change-over point in the direction indicated by "B" (see Fig. 11/2). When "open", screw in the screw (34) (hexagon head cap screw M2.5x8, not supplied) to push the microswitch in the direction indicated by "A" up to the change-over point.
3. At this point, continue to tighten the screw (34) by the adjustment length "L" or by the screw-in angle α specified in Table 23/1 and position it correctly by tightening one of the cheese head screws (29).
4. Secure the second cheese head screw (29) with Loctite type 241 and tighten it (M_A tightening torque specified in Table 23/1). Loosen the first cheese head screw (29), apply Loctite 241 and re-tighten it.
5. Remove the screw (34) after completion of the microswitch adjustment.
6. Switch the brake module on and off to check that the microswitch (27) works correctly.

C = common contact

NO = normally open contact

	Size			
	13	19	24	29
Adjustment length L of screw (34) [mm]	0.11	0.15	0.2	0.2
Screw-in angle α of screw (34) [°]	90	120	160	160
M_A tightening torque of machine screw (29) [Nm]	0.7	0.7	0.7	0.7

Table 23/1: M_A tightening torque of cheese head screws (29), adjustment length L and screw-in angle α of screw (34)



6.4 Brake shaft (13) removal



Caution!

As high pressures are generated during the removal of the brake shaft, personal protection equipment, such as face guards, gloves etc., and protective covers must be used.

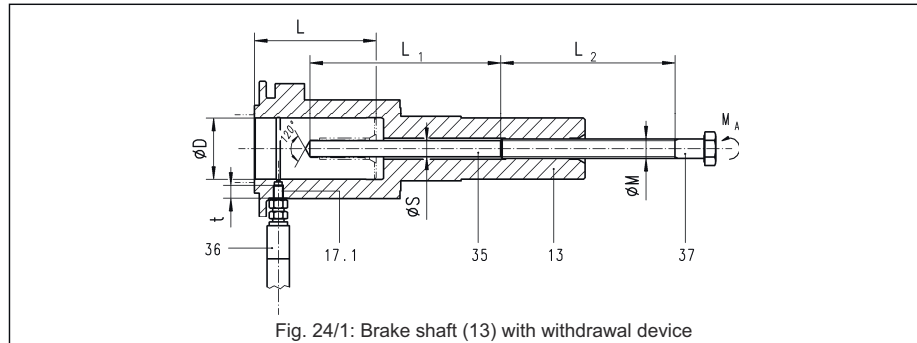
Proceed with extreme caution and follow all relevant safety instructions when removing the brake shaft (13). The brake shaft (13) must be removed by means of an oil pressure system (see Fig. 24/1).

1. To this end, a withdrawal device consisting of a forcing screw (37), a forcing pin (35) and an oil injector or oil pump (36) must be used. Remove the screw plug (17) and screw the oil injector or oil pump (36) connection into the oil inlet bore (17.1).
2. Insert the forcing pin (35) on the front face of the brake shaft (13) up to the limit stop and slightly tighten it by means of the forcing screw (37).
3. The pressure oil must be supplied through the oil inlet bore. The oil pressure should be gradually increased to about 60 % of the maximum pressure p_{max} . Then the pressure should be kept constant for about 60 minutes.
4. Proceed to increase the pressure to the maximum oil pressure p_{max} . After the maximum pressure has been reached, screw in the forcing screw (37) smoothly and evenly so that the brake shaft (13) can be pulled off the motor shaft. While removing the brake shaft, the tangential torque arm should be applied to the square socket (size 13, 19, 24 brakes) or to the external teeth of the brake shaft (13) (size 29 brakes). The technical specifications applicable to the brake shaft (13) removal are given in Table 25/1.



Note!

Pressure oil type LHDF900 with a viscosity of 900 mm²/s at 20°C supplied by SKF can be used, for instance.



Key to Fig. 24/1:

13	Brake shaft	L ₁	Forcing pin (35) length
17.1	Oil inlet bore	L ₂	Forcing screw (37) thread length
35	Forcing pin	D	Shaft end diameter (motor)
36	Oil pump	S	Forcing pin (35) diameter
37	Forcing screw	M	Forcing screw (37) thread diameter
L	Shaft end length (motor)	M _A	Forcing screw (37) loosening torque



	Size			
	13	19	24	29
Motor shaft height	AH 80	AH 100	AH 132	AH 160
Oil inlet bore / screw-in depth t [mm]	M6/7.5	M6/8	Rp1/8"/9.5	Rp1/8"/10
Oil pressure p_{max} [bar]	1400	1400	1400	1400
Forcing pin (35) length L_1 [mm]	124	124	160	170
Forcing screw (37) thread length L_2 [mm]	130	130	170	170
Forcing pin (35) diameter S [mm]	9.8	9.8	13	17
Forcing screw (37) thread diameter M [mm]	12	12	16	20
Forcing screw tightening torque M_A [Nm]	15	35	60	90
Oil pump / oil injector connection tightening torque M_A [Nm]	4	4	10	10

Table 25/1: Technical specifications for brake shaft (13) removal

7. Motor design

The brake module must be mounted to a motor that complies with the following requirements:

- ☒ Motor mounting type IMB5 or IMB35
- ☒ Motor shaft end and flange tolerances (axial and radial runout) to EN 50347-R
- ☒ Brake module shaft end and flange tolerances to EN 50347-N after mounting to motor
- ☒ Motor shaft without feather key due to brake shaft removal from motor shaft by means of an oil pressure system
- ☒ The fits and surface roughness depths of the brake shaft bore and motor shaft ($R_z < 6.3$) required to ensure reliable press-fit must be agreed with the brake manufacturer.
- ☒ Balancing of the brake shaft with a half key (half key balancing) to DIN ISO 8821

The permitted transverse forces acting on the shaft end of the motor/brake unit and the permitted axial forces are specified in the motor specification sheet.



Note!

Mounting of the brake module to the motor may cause heat build-up on the A-face motor end shield as heat dissipation towards the machine wall is inhibited. Consequently, only fan-cooled motors must be used.



8. Driven components, balancing

The installation and removal of driven components, such as clutch, gear, pulley, etc., on the brake shaft must be carried out using suitable devices and tools. Use the thread in the brake shaft for installation purposes and heat the components prior to assembly, if possible. In order to protect the centring piece and thread in the brake shaft, a shim must be inserted before removing driven components (see Fig. 26/1). The brake shaft is balanced with a half key (half key balancing to DIN ISO 8821). Check that the correct balancing method is used when installing the driven components.



Note!

General precautions must be taken to prevent accidental contact with driven components. The brake is an electromagnetic device which may generate electromagnetic stray flux. In general, driven components remain unaffected by the presence of such stray flux.

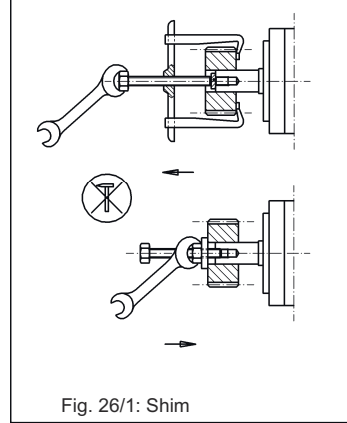


Fig. 26/1: Shim

9. Condition at delivery

The brake module is delivered in a preassembled condition with factory-adjusted (standard) transmissible torque M_4 . The brake shaft with screw plug, spring washer, ball bearing, circlip, feather key, hand release, rubber bolts (size 19 and 24 brakes) and O-ring (size 29 brakes) are not included in the scope of supply.

The ball bearing set (ball bearing, spring washer, circlip), hand release, brake shaft with screw plug, rubber bolts (size 19 and 24 brakes) or O-ring (size 29 brakes) can be ordered as accessories.

The brake module can be equipped with an optional microswitch.

The friction disc is centred relative to the brake centre to facilitate brake mounting.



Attention!

In order to avoid any shift of the friction disc, the brake unit should only be released electromagnetically or by means of the hand release lever when the friction disc is guided by the brake shaft. Brakes equipped with microswitches are delivered with factory-adjusted microswitch.

Upon receipt of the shipment, the brake must be checked for transit damage before storage.

Ordered accessories are delivered together with the brake.

The spring-applied single-disc brake module is delivered ready for mounting with factory-adjusted M_4 transmissible torque and factory-adjusted rated air gap 's'.



Attention!

The brake module should be transported and stored in vertical position with the output side solenoid housing (1.1) flange pointing upwards. This flange must be provided with eye bolts (e.g. to DIN 580) fixed to two diagonally opposite fixing bores. These eye bolts are required to attach handling equipment secured with nuts for internal transport purposes or for mounting the brake module to the motor.

**Note!**

If the brake module is equipped with a microswitch, make sure the microswitch is not exposed to shocks and vibrations during brake transport and storage. This is crucial to avoid any changes in the microswitch adjustment. The same applies to the connector box of the brake module. If the brake is not installed immediately upon delivery, it must be stored in a dry, dust-free and vibration-proof place.

10. Troubleshooting

Fault	Cause	Corrective actions
Brake release failure	☒ Air gap too large	Check the air gap. Install a new friction disc, if necessary.
	☒ No voltage applied to brake	Check the electrical connection and correct faults, if found.
	☒ Voltage applied to field coil too low	Check the field coil supply voltage and correct faults, if found.
	☒ Armature plate blocked mechanically	Eliminate mechanical blocks. Install a new brake, if necessary.
	☒ Damaged rectifier	Check the rectifier and replace it, if necessary.
	☒ Damaged field coil	Check the field coil resistance. Install a new brake, if necessary.
Delayed brake release	☒ Friction disc thermally overloaded	Install a new friction disc.
	☒ Air gap too large	Check the air gap. Install a new friction disc, if necessary.
Brake engagement failure	☒ Voltage applied to field coil too low	Check the field coil supply voltage and correct faults, if found.
	☒ Voltage applied to field coil in unpowered condition too high (residual voltage)	Check whether residual voltage is applied to the field coil and correct faults, if found.
Delayed brake engagement	☒ Armature plate blocked mechanically	Eliminate mechanical blocks. Install a new brake, if necessary.
	☒ Voltage applied to field coil too high	Check the field coil supply voltage and correct faults, if found.
Brake torque too low	☒ Air gap too large	Check the air gap. Install a new friction disc, if necessary.
	☒ Oily or greasy friction surfaces	Install a new friction disc.
	☒ Broken compression spring	Install a new brake module.
Microswitch failure	☒ Damaged microswitch	Install a new microswitch.
	☒ Adjustment error of microswitch switching point	Readjust the microswitch switching point.

Table 27/1: Possible faults, causes and corrective actions (list not exhaustive)



11. Definitions

(based on: DIN VDE 0580 November 2011, not exhaustive)

Transmissible torque M_A	highest torque that can be applied to the engaged brake or clutch without causing the brake/clutch to slip
Rated voltage U_N	supply voltage specified by the manufacturer for voltage windings to identify the device or component
Rated air gap s	air gap of a new brake
Maximum air gap s_{max}	maximum possible air gap at the wear limit during brake operation

The switching times are defined in DIN VDE 0580. When using static systems (holding operation), the switching times can also be determined on the basis of the current flow (see Fig. 28/1).

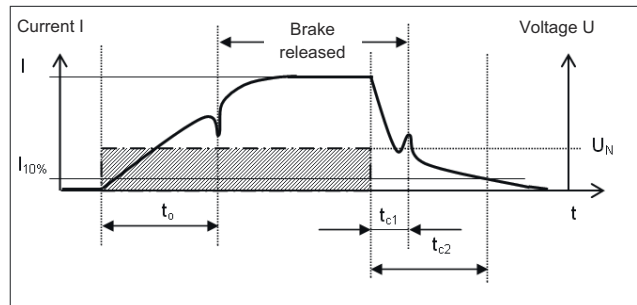


Fig. 28/1: Definition of switching times for (static) holding operation

Definitions:

t_0	opening time (open) –	brake mechanically open
t_{c1}	closing time (close) –	brake mechanically closed
t_{c2}	activation time –	brake mechanically closed and full holding torque reached almost completely

12. Technical specifications

	13	19	24	29
Rated air gap s [mm]	$0.3^{+0.2}$	$0.35^{+0.2}$	$0.4^{+0.25}$	$0.45^{+0.25}$
Max. air gap s_{max} (at 70% of rated current) [mm]	0.65	0.8	1.05	1.2

Table 28/1: Air gap s_{nom} and s_{max}

	Size			
	13	19	24	29
Speed n [rpm]	250	125	125	125
Coil ON time t_s [s]	6	6	6	6
Coil OFF time t_b [s]	1	1	1	1
Break-in period t_{tot} [min]	3	3	3	3

Table 28/2: Break-in process parameters for the spring-applied single-disc brake module



Technical specifications	
Switching capacity	250 VAC, 5 A
	400 VAC, 1.5 A
	24 VAC, 2 A
Min. switching power	12 VDC, 10 mA
Mech. service life [switching operations]	5 x 10 ⁷
Contact type	normally open contact
Temperature range [°C]	–40 to +130
Protection	IP 67

Table 29/1: Microswitch specifications

The required operating conditions specified in **DIN VDE 0580** must be observed during operation of the spring-applied single-disc brake module!

Specifications subject to change without notice!

13. Revision history

Date of issue:

Issue dated 12 December 2013

Issue dated 2 July 2012 (initial issue)

Modifications:

Text revisions on page 16 and 17

–



WE MAGNETISE THE WORLD

INDUSTRIAL DRIVE SYSTEMS

Kendrion (Villingen) GmbH

Industrial Drive Systems
Wilhelm-Binder Straße 4-6
78048 Villingen-Schwenningen

Tel. +49 7721 877-1417

Fax +49 7721 877-1462

www.kendrion.com

sales-ids@kendrion.com

A.3 SH 80 model harici fanın işletme kılavuzu

A.3.1 W2S135FA7905 model harici fanın işletme kılavuzu

W2S135-FA79-05

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG

Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION

1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2

2. INTENDED USE

3

3. TECHNICAL DATA

4

3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5

4. CONNECTION AND STARTUP

6

4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	6
4.4 Connection diagram	7
4.5 Checking connections	8
4.6 Switching on the device	8
4.7 Switching off the device	8

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

8

5.1 Cleaning	8
5.2 Safety inspection	9
5.3 Disposal	9

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2S135-FA79-05

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.


DANGER
Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION
In the event of a fault, the rotor and the impeller will be energized

- The rotor and the impeller have basic insulation.
- Do not touch the rotor and impeller once installed.

CAUTION
The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features


DANGER
Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.
If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement


DANGER
Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING**Rotating device**

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING
Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE**Risk of fire**

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE**Transporting the device**

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FA79-05

Operating instructions

2. INTENDED USE

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions



Operating instructions

3.1 Product drawing



1	Airflow direction "V"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	N (brown)
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	not used
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

W2S135-FA79-05

Operating instructions

3.2 Nominal data

Motor	M2S052-CA		
Phase	1~	1~	1~
Nominal voltage / VAC	230	230	265
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2800	3250	3350
Power consumption / W	25	25	31
Current draw / A	0.17	0.15	0.17
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	80	80	80
Starting current / A	0.28	0.25	

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

195-255 V 50/60Hz: 0.21/0.17 A

238-292 V 60Hz: 0.21 A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	V
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP55
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	EAC; CSA C22.2 No. 100; UL 1004-1



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2S135-FA79-05

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging

Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

→ Check the device for transport damage. Damaged devices are not to be installed.

→ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

→ Check whether the information on the nameplate matches the connection data.

→ Before connecting the device, make sure the power supply matches the device voltage.

→ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Plug connection

4.3.1 Making supply connections

→ Check your connector's pin assignment.

→ Connect the built-in connector with the mating connector.

→ Ensure that the connector is properly engaged.

4.3.2 Motor protection



WARNING

Device has no overheating protection

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

→ For the version without thermal overload protector, also install a suitable motor protection switch.

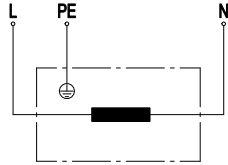
For devices without a thermal overload protector, a suitable switch-off device must also be used.



W2S135-FA79-05

Operating instructions

4.4 Connection diagram



L	blue
PE	green/yellow
N	brown

Translation of the original operating instructions



W2S135-FA79-05

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE

CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FA79-05

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner.# Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic. Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.



W2S135-FA79-05

Operating instructions

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



A.3.2 W2S135FA7907 model harici fanın işletme kılavuzu

W2S135-FA79-07

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG

Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	6
4.4 Connection diagram	7
4.5 Checking connections	8
4.6 Switching on the device	8
4.7 Switching off the device	8
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	8
5.1 Cleaning	8
5.2 Safety inspection	9
5.3 Disposal	9

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:

**DANGER**

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2S135-FA79-07

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER

Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

The rotor and the impeller have basic insulation.

- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER

Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. # Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.

If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER

Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FA79-07

Operating instructions

2. INTENDED USE

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

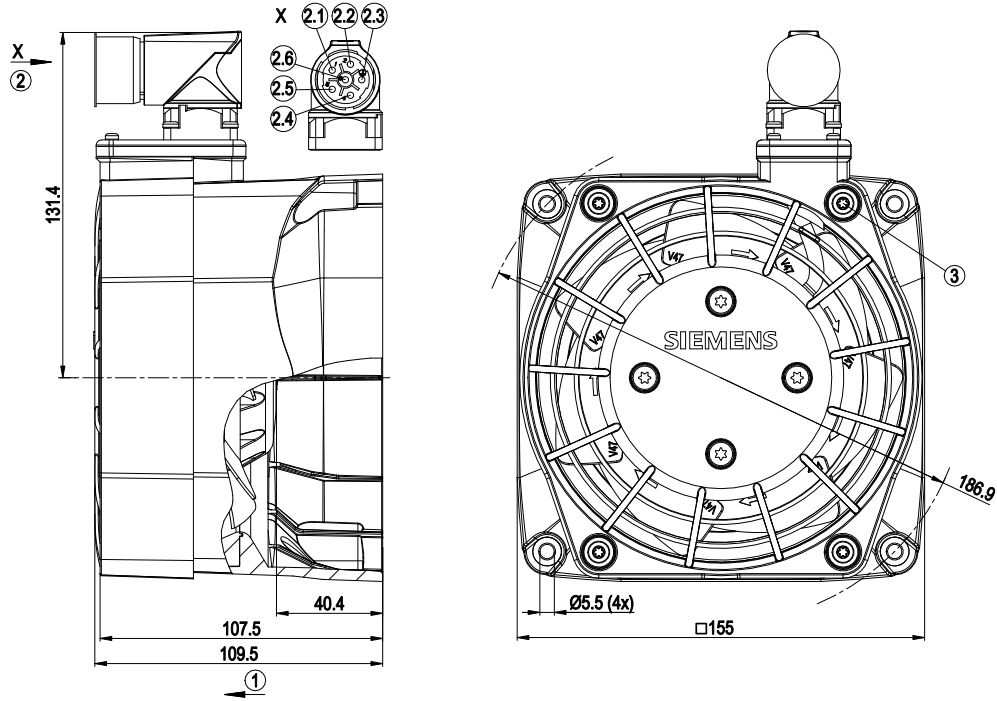


W2S135-FA79-07

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Airflow direction "V"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	N (brown)
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	not used
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FA79-07

Operating instructions

3.2 Nominal data

Motor	M2S052-CA		
Phase	1~	1~	1~
Nominal voltage / VAC	230	230	265
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2800	3250	3350
Power consumption / W	25	25	31
Current draw / A	0.17	0.15	0.17
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	80	80	80
Starting current / A	0.28	0.25	

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

195-255 V 50/60Hz: 0.21/0.17 A

238-292 V 60Hz: 0.21 A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	V
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP65
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C



W2S135-FA79-07

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging



Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Plug connection

4.3.1 Making supply connections

⇒ Check your connector's pin assignment.

⇒ Connect the built-in connector with the mating connector.

⇒ Ensure that the connector is properly engaged.

4.3.2 Motor protection



WARNING

Device has no overheating protection

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

→ For the version without thermal overload protector, also install a suitable motor protection switch.

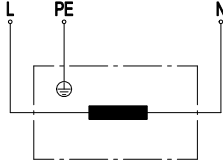
For devices without a thermal overload protector, a suitable switch-off device must also be used.



W2S135-FA79-07

Operating instructions

4.4 Connection diagram



L	blue
PE	green/yellow
N	brown



W2S135-FA79-07

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

- Ensure that no combustible or flammable materials are located close to the fan.
- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexperienced handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FA79-07

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic. Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.



W2S135-FA79-07

Operating instructions

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.

Translation of the original operating instructions



A.3.3 W2S135FA8309 model harici fanın işletme kılavuzu

W2S135-FA83-09

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG

Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION

1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2

2. INTENDED USE

3

3. TECHNICAL DATA

4

3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5

4. CONNECTION AND STARTUP

6

4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	6
4.4 Connection diagram	7
4.5 Checking connections	8
4.6 Switching on the device	8
4.7 Switching off the device	8

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

8

5.1 Cleaning	8
5.2 Safety inspection	9
5.3 Disposal	9

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2S135-FA83-09

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.

**DANGER****Electrically charged device**

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION**In the event of a fault, the rotor and the impeller will be energized**

The rotor and the impeller have basic insulation.

- Do not touch the rotor and impeller once installed.

CAUTION**The motor restarts automatically when operating voltage is applied, e.g. after a power failure.**

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features

**DANGER****Guard missing and guard not functioning**

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.
If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement

**DANGER****Rotating device**

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING**Rotating device**

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING**Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).**

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE**Risk of fire**

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE**Transporting the device**

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FA83-09

Operating instructions

2. INTENDED USE

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

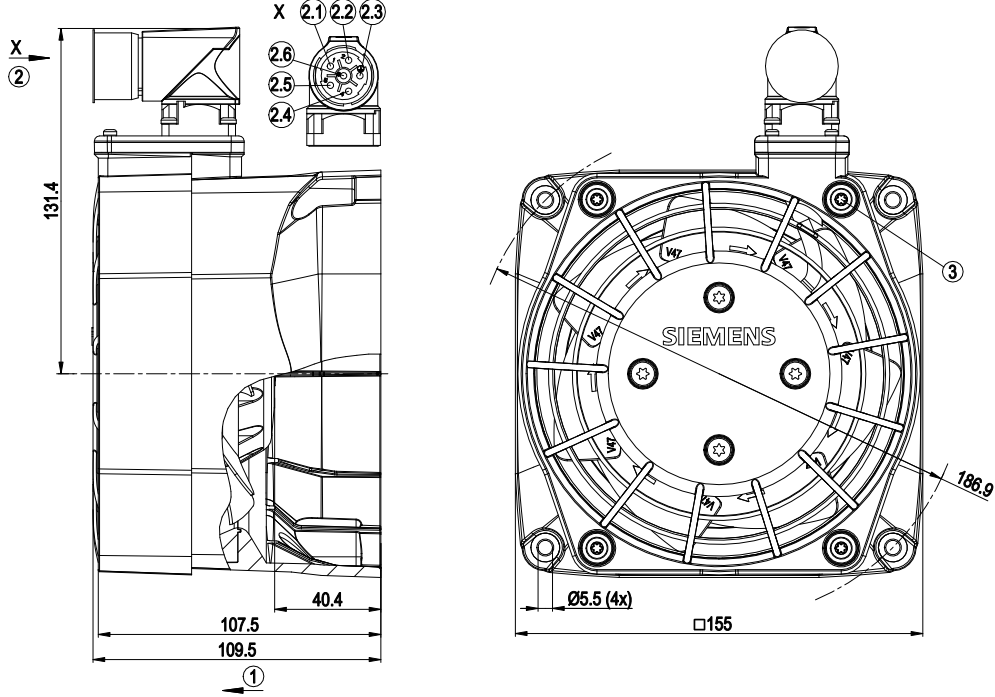


W2S135-FA83-09

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Airflow direction "V"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	not used
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	L2 (brown)
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FA83-09

Operating instructions

3.2 Nominal data

Motor	M2S052-CA	
Phase	2~	2~
Nominal voltage / VAC	400	400
Frequency / Hz	50	60
Method of obtaining data	ce	ce
Valid for approval/standard	CE	CE
Speed (rpm) / min ⁻¹	2800	3250
Power consumption / W	28	27
Current draw / A	0.11	0.09
Min. ambient temperature / °C	-25	-25
Max. ambient temperature / °C	80	80
Starting current / A	0.18	0.16

ml = Max. load · me = Max. efficiency · fa = Free air
 cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

340-440 V 50/60 Hz: 0.14A/0.11A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	V
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP55
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2S135-FA83-09

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging
Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

→ Check the device for transport damage. Damaged devices are not to be installed.

→ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device
If the device slips during installation, serious damage can result.
→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation
Risk of fatal injury from electric shock
→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION
Voltage
The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

→ Check whether the information on the nameplate matches the connection data.

→ Before connecting the device, make sure the power supply matches the device voltage.

→ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Plug connection

4.3.1 Making supply connections

→ Check your connector's pin assignment.

→ Connect the built-in connector with the mating connector.

→ Ensure that the connector is properly engaged.

4.3.2 Motor protection



WARNING
Device has no overheating protection

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

→ For the version without thermal overload protector, also install a suitable motor protection switch.

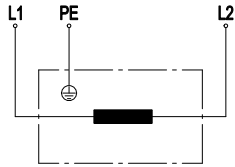
For devices without a thermal overload protector, a suitable switch-off device must also be used.



W2S135-FA83-09

Operating instructions

4.4 Connection diagram



L1	blue
PE	green/yellow
L2	brown

Translation of the original operating instructions



W2S135-FA83-09

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE

CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FA83-09

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner.# Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic. Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.



W2S135-FA83-09

Operating instructions

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



A.3.4 W2S135FA8311 model harici fanın işletme kılavuzu

W2S135-FA83-11

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG

Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	6
4.4 Connection diagram	7
4.5 Checking connections	8
4.6 Switching on the device	8
4.7 Switching off the device	8
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	8
5.1 Cleaning	8
5.2 Safety inspection	9
5.3 Disposal	9

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:

**DANGER**

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2S135-FA83-11

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER

Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

The rotor and the impeller have basic insulation.

- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER

Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. # Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.

If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER

Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FA83-11

Operating instructions

2. INTENDED USE

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

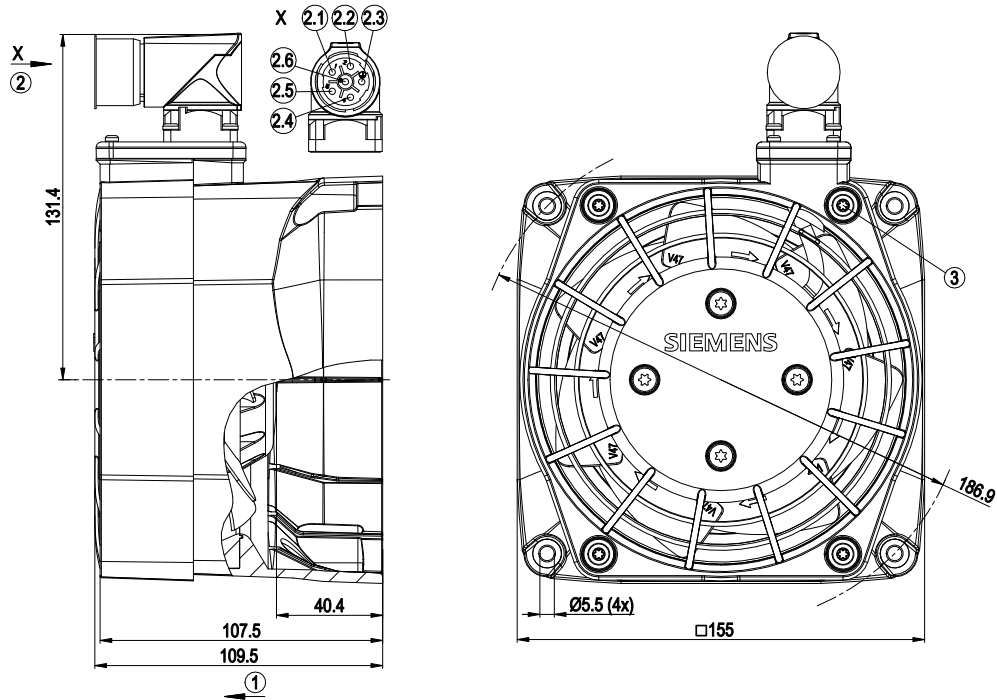


W2S135-FA83-11

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Airflow direction "V"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	not used
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	L2 (brown)
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FA83-11

Operating instructions

3.2 Nominal data

Motor	M2S052-CA	
Phase	2~	2~
Nominal voltage / VAC	400	400
Frequency / Hz	50	60
Method of obtaining data	ce	ce
Valid for approval/standard	CE	CE
Speed (rpm) / min ⁻¹	2800	3250
Power consumption / W	28	27
Current draw / A	0.11	0.09
Min. ambient temperature / °C	-25	-25
Max. ambient temperature / °C	80	80
Starting current / A	0.18	0.16

ml = Max. load · me = Max. efficiency · fa = Free air
 cs = Customer specification · ce = Customer equipment

Subject to change

I_{max}:

340-440 V 50/60 Hz: 0.14A/0.11A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	V
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP65
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	UL 1004-1; EAC; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C



W2S135-FA83-11

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging



Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Plug connection

4.3.1 Making supply connections

⇒ Check your connector's pin assignment.

⇒ Connect the built-in connector with the mating connector.

⇒ Ensure that the connector is properly engaged.

4.3.2 Motor protection



WARNING

Device has no overheating protection

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

→ For the version without thermal overload protector, also install a suitable motor protection switch.

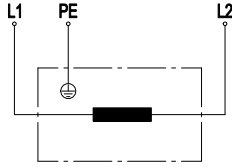
For devices without a thermal overload protector, a suitable switch-off device must also be used.



W2S135-FA83-11

Operating instructions

4.4 Connection diagram



L1	blue
PE	green/yellow
L2	brown



W2S135-FA83-11

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

- Ensure that no combustible or flammable materials are located close to the fan.
- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexperienced handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
Motor overtemperature	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FA83-11

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. # Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic. Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.



W2S135-FA83-11

Operating instructions

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.

Translation of the original operating instructions



A.3.5 W2S135FB1106 model harici fanın işletme kılavuzu

W2S135-FB11-06

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG

Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION

1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2

2. INTENDED USE

3

3. TECHNICAL DATA

4

3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5

4. CONNECTION AND STARTUP

6

4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	6
4.4 Connection diagram	7
4.5 Checking connections	8
4.6 Switching on the device	8
4.7 Switching off the device	8

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

8

5.1 Cleaning	8
5.2 Safety inspection	9
5.3 Disposal	9

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2S135-FB11-06

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER

Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

The rotor and the impeller have basic insulation.

- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER

Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.

If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER

Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FB11-06

Operating instructions

2. INTENDED USE

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

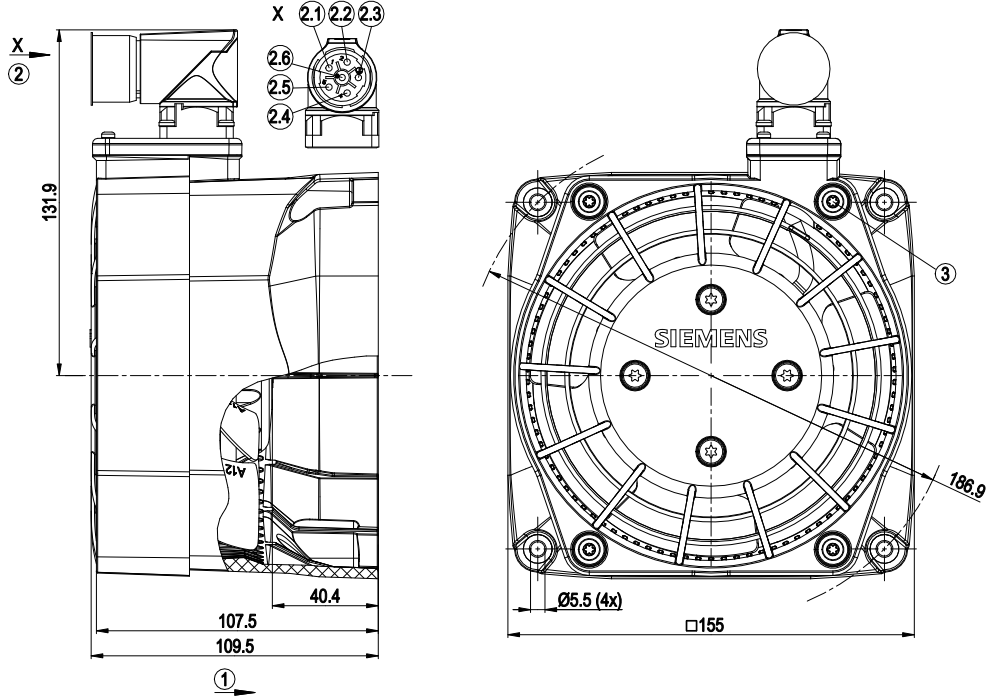


W2S135-FB11-06

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Direction of air flow "A"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	N (brown)
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	not used
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FB11-06

Operating instructions

3.2 Nominal data

Motor	M2S052-CA		
Phase	1~	1~	1~
Nominal voltage / VAC	230	230	265
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2750	3100	3250
Power consumption / W	41	41	51
Current draw / A	0.27	0.23	0.28
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	60	65	60
Starting current / A	0.43	0.35	

ml = Max. load · me = Max. efficiency · fa = Free air
 cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

195-255 V 50/60Hz: 0.35/0.265 A

238-292 V 60Hz: 0.35 A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	A
Direction of rotation	Clockwise, viewed toward rotor
Degree of protection	IP55
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2S135-FB11-06

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging
Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

→ Check the device for transport damage. Damaged devices are not to be installed.

→ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device
If the device slips during installation, serious damage can result.
→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation
Risk of fatal injury from electric shock
→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION
Voltage
The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

→ Check whether the information on the nameplate matches the connection data.

→ Before connecting the device, make sure the power supply matches the device voltage.

→ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Plug connection

4.3.1 Making supply connections

→ Check your connector's pin assignment.

→ Connect the built-in connector with the mating connector.

→ Ensure that the connector is properly engaged.

4.3.2 Motor protection



WARNING
Device has no overheating protection

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

→ For the version without thermal overload protector, also install a suitable motor protection switch.

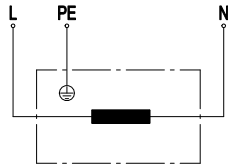
For devices without a thermal overload protector, a suitable switch-off device must also be used.



W2S135-FB11-06

Operating instructions

4.4 Connection diagram



L	blue
PE	green/yellow
N	brown

Translation of the original operating instructions



W2S135-FB11-06

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

- Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE

CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases. During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
Motor overtemperature	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FB11-06

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner.# Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic. Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.



W2S135-FB11-06

Operating instructions

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



A.3.6 W2S135FB1108 model harici fanın işletme kılavuzu

W2S135-FB11-08

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG

Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	6
4.4 Connection diagram	7
4.5 Checking connections	8
4.6 Switching on the device	8
4.7 Switching off the device	8
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	8
5.1 Cleaning	8
5.2 Safety inspection	9
5.3 Disposal	9

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:

**DANGER**

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2S135-FB11-08

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER

Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

The rotor and the impeller have basic insulation.

- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER

Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. # Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices.

If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER

Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FB11-08

Operating instructions

2. INTENDED USE

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

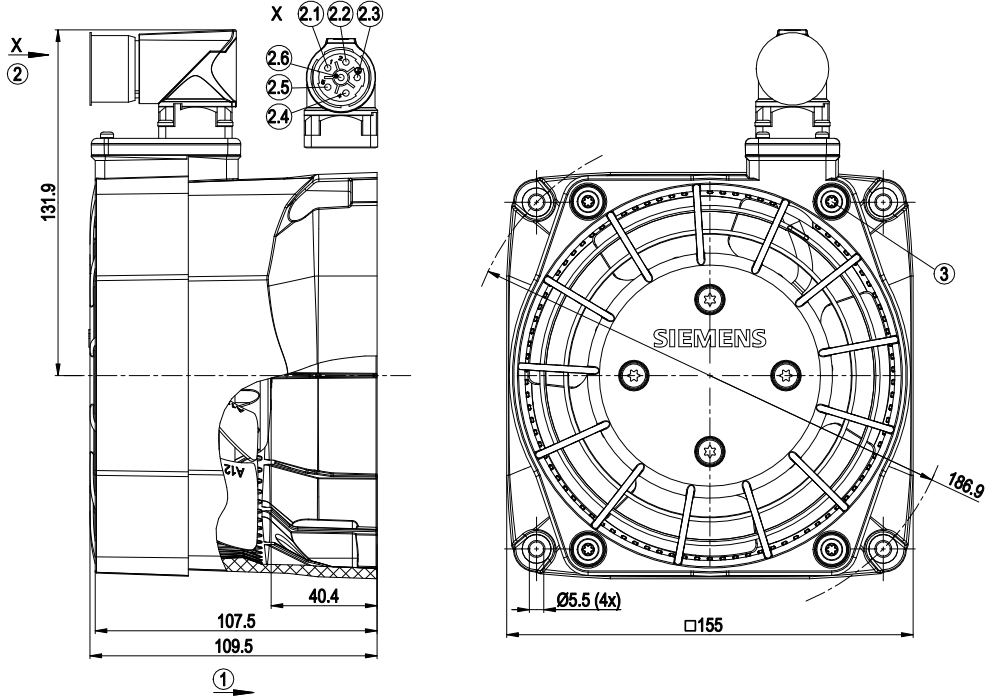


W2S135-FB11-08

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Direction of air flow "A"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	N (brown)
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	not used
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FB11-08

Operating instructions

3.2 Nominal data

Motor	M2S052-CA		
Phase	1~	1~	1~
Nominal voltage / VAC	230	230	265
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2750	3100	3250
Power consumption / W	41	41	51
Current draw / A	0.27	0.23	0.28
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	60	65	60
Starting current / A	0.43	0.35	

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

195-255 V 50/60Hz: 0.35/0.265 A

238-292 V 60Hz: 0.35 A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	A
Direction of rotation	Clockwise, viewed toward rotor
Degree of protection	IP65
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	UL 1004-1; EAC; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C



W2S135-FB11-08

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging



Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Plug connection

4.3.1 Making supply connections

⇒ Check your connector's pin assignment.

⇒ Connect the built-in connector with the mating connector.

⇒ Ensure that the connector is properly engaged.

4.3.2 Motor protection



WARNING

Device has no overheating protection

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

→ For the version without thermal overload protector, also install a suitable motor protection switch.

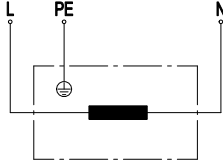
For devices without a thermal overload protector, a suitable switch-off device must also be used.



W2S135-FB11-08

Operating instructions

4.4 Connection diagram



L	blue
PE	green/yellow
N	brown



W2S135-FB11-08

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

- Ensure that no combustible or flammable materials are located close to the fan.
- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexperienced handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
Motor overtemperature	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FB11-08

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic. Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.



W2S135-FB11-08

Operating instructions

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.

Translation of the original operating instructions



A.3.7 W2S135FB5910 model harici fanın işletme kılavuzu

W2S135-FB59-10

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG
 Bachmühle 2
 D-74673 Mulfingen
 Phone +49 (0) 7938 81-0
 Fax +49 (0) 7938 81-110
 info1@de.ebmpapst.com
 www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	1
1.5 Safety and protective features	2
1.6 Mechanical movement	2
1.7 Emissions	2
1.8 Hot surface	2
1.9 Transport	2
1.10 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	7
4.4 Connection diagram	8
4.5 Checking connections	9
4.6 Switching on the device	9
4.7 Switching off the device	9
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	9
5.1 Cleaning	9
5.2 Safety inspection	10
5.3 Disposal	10

Translation of the original operating instructions

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.

- ⇒ Replace loose connections and defective cables immediately.



DANGER

Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.



W2S135-FB59-10

Operating instructions



WARNING

Live terminals and connections even with device switched off

Electric shock

→ Wait five minutes after disconnecting the voltage at all poles before opening the device.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

The rotor and the impeller have basic insulation.

→ Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

→ Keep out of the device's danger zone.

→ When working on the device, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER

Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

→ The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.

→ Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Mechanical movement



DANGER

Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

→ Secure the device against accidental contact.

→ Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

→ Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.

→ Protect long hair with a cap.

1.7 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

→ Take appropriate technical safety measures.

→ Protect operating personnel with appropriate safety equipment such as hearing protection.

→ Also observe the requirements of local agencies.

1.8 Hot surface



CAUTION

High temperature on motor housing

Risk of burns

→ Ensure sufficient protection against accidental contact.

1.9 Transport

NOTE

Transporting the device

→ Transport the device in its original packaging only.

→ Secure the device so it cannot slip, e.g. by using a lashing strip.

1.10 Storage

⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.

⇒ Protect the device against environmental effects and dirt until final installation.

⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.

⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.

⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FB59-10

Operating instructions

2. INTENDED USE

The device is exclusively designed as a built-in device for conveying air according to its technical data.

Any other usage above and beyond this does not conform with the intended purpose and constitutes misuse of the device.

Customer equipment must be capable of withstanding the mechanical and thermal stresses that can arise from this product. This applies for the entire service life of the equipment in which this product is installed.

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

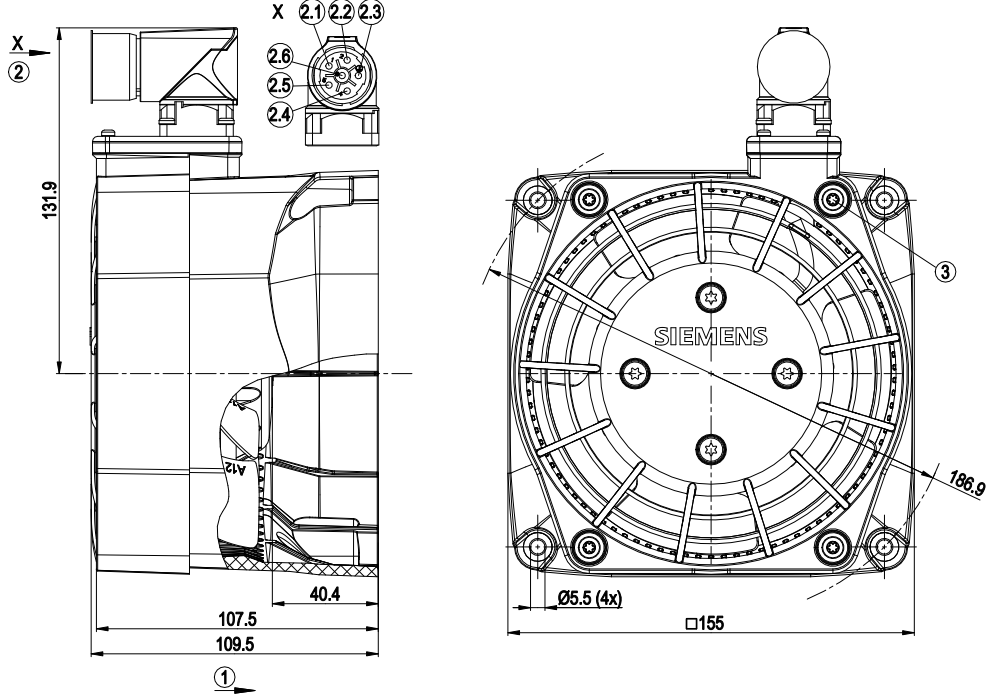


W2S135-FB59-10

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Airflow direction "V"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	not used
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	L2 (brown)
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FB59-10

Operating instructions

3.2 Nominal data

Motor	M2S052-CA	
Phase	2~	2~
Nominal voltage / VAC	400	400
Frequency / Hz	50	60
Method of obtaining data	ce	ce
Valid for approval/standard	CE	CE
Speed (rpm) / min ⁻¹	2750	3150
Power consumption / W	44	41
Current draw / A	0.17	0.14
Min. ambient temperature / °C	-25	-25
Max. ambient temperature / °C	60	70
Starting current / A	0.25	0.22

ml = Max. load · me = Max. efficiency · fa = Free air
 cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

340-440 V 50/60 Hz: 0.22A/0.17A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	A
Direction of rotation	Clockwise, viewed toward rotor
Degree of protection	IP55
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2S135-FB59-10

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging

Blades can bend



→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

→ Check the device for transport damage. Damaged devices are not to be installed.

→ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device

Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The fan is a built-in component and has no disconnecting switch.

→ Only connect the fan to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the fan, secure the system/machine in which the fan is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

→ Check whether the information on the nameplate matches the connection data.

→ Before connecting the device, make sure the power supply matches the device voltage.

→ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Voltage control



NOTE

Current overshoots may occur if speed control is implemented by transformers or electronic voltage regulators (e.g. phase control). Depending on the type of installation of the device, noise and vibration may also occur in the case of phase control. Vibration can lead to bearing damage and thus premature failure.

Heating-up of the motor when using voltage control must be checked by the customer following installation in the end device.

4.2.3 Variable frequency drive

Please use a variable frequency drive only after consultation with ebmpapst.



For operation with variable frequency drives, install sinusoidal filters that work on all poles (phase-phase and phase-ground) between the drive and the motor.

During operation with variable frequency drives, an all-pole sine filter protects the motor against high-voltage transients that can destroy the coil insulation system, and against harmful bearing currents.

Heating-up of the motor when using a variable frequency drive must be checked by the customer following installation in the end device.



W2S135-FB59-10

Operating instructions

4.3 Plug connection

4.3.1 Making supply connections

- ⇒ Check your connector's pin assignment.
- ⇒ Connect the built-in connector with the mating connector.
- ⇒ Ensure that the connector is properly engaged.

4.3.2 Motor protection

**WARNING****Device has no overheating protection**

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

- For the version without thermal overload protector, also install a suitable motor protection switch.

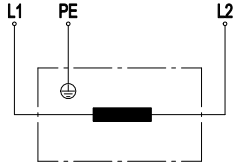
Translation of the original operating instructions



W2S135-FB59-10

Operating instructions

4.4 Connection diagram



L1	blue
PE	green/yellow
L2	brown



W2S135-FB59-10

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

- Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

Do not perform any repairs on your device. Send the device to ebm-papst for repair or replacement.



WARNING
Live terminals and connections even with device switched off
Electric shock

- Wait five minutes after disconnecting the voltage at all poles before opening the device.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FB59-10

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables
Welds for crack formation	Visual inspection	At least every 6 months	Replace device

Abnormal bearing noise	acoustic	At least every 6 months	Replace device
------------------------	----------	-------------------------	----------------

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic.

Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors



W2S135-FB59-10

Operating instructions

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.

Translation of the original operating instructions



A.3.8 W2S135FB5912 model harici fanın işletme kılavuzu

W2S135-FB59-12

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG
 Bachmühle 2
 D-74673 Mulfingen
 Phone +49 (0) 7938 81-0
 Fax +49 (0) 7938 81-110
 info1@de.ebmpapst.com
 www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	1
1.5 Safety and protective features	2
1.6 Mechanical movement	2
1.7 Emissions	2
1.8 Hot surface	2
1.9 Transport	2
1.10 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Plug connection	7
4.4 Connection diagram	8
4.5 Checking connections	9
4.6 Switching on the device	9
4.7 Switching off the device	9
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	9
5.1 Cleaning	9
5.2 Safety inspection	10
5.3 Disposal	10

Translation of the original operating instructions

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.

- ⇒ Replace loose connections and defective cables immediately.



DANGER

Electrically charged device

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.



W2S135-FB59-12

Operating instructions

**WARNING****Live terminals and connections even with device switched off**

Electric shock

→ Wait five minutes after disconnecting the voltage at all poles before opening the device.

CAUTION**In the event of a fault, the rotor and the impeller will be energized**

The rotor and the impeller have basic insulation.

→ Do not touch the rotor and impeller once installed.

CAUTION**The motor restarts automatically when operating voltage is applied, e.g. after a power failure.**

Risk of injury

→ Keep out of the device's danger zone.

→ When working on the device, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the device comes to a stop.

1.5 Safety and protective features**DANGER****Guard missing and guard not functioning**

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

→ The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.

→ Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Mechanical movement**DANGER****Rotating device**

Risk of injury to body parts coming into contact with the rotor or the impeller.

→ Secure the device against accidental contact.

→ Before working on the system/machine, wait until all parts have come to a standstill.

WARNING**Rotating device**

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

→ Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.

→ Protect long hair with a cap.

1.7 Emissions**WARNING****Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).**

Risk of noise-induced hearing loss

→ Take appropriate technical safety measures.

→ Protect operating personnel with appropriate safety equipment such as hearing protection.

→ Also observe the requirements of local agencies.

1.8 Hot surface**CAUTION****High temperature on motor housing**

Risk of burns

→ Ensure sufficient protection against accidental contact.

1.9 Transport**NOTE****Transporting the device**

→ Transport the device in its original packaging only.

→ Secure the device so it cannot slip, e.g. by using a lashing strip.

1.10 Storage

⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.

⇒ Protect the device against environmental effects and dirt until final installation.

⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.

⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.

⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.



W2S135-FB59-12

Operating instructions

2. INTENDED USE

The device is exclusively designed as a built-in device for conveying air according to its technical data.

Any other usage above and beyond this does not conform with the intended purpose and constitutes misuse of the device.

Customer equipment must be capable of withstanding the mechanical and thermal stresses that can arise from this product. This applies for the entire service life of the equipment in which this product is installed.

Intended use also includes

- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

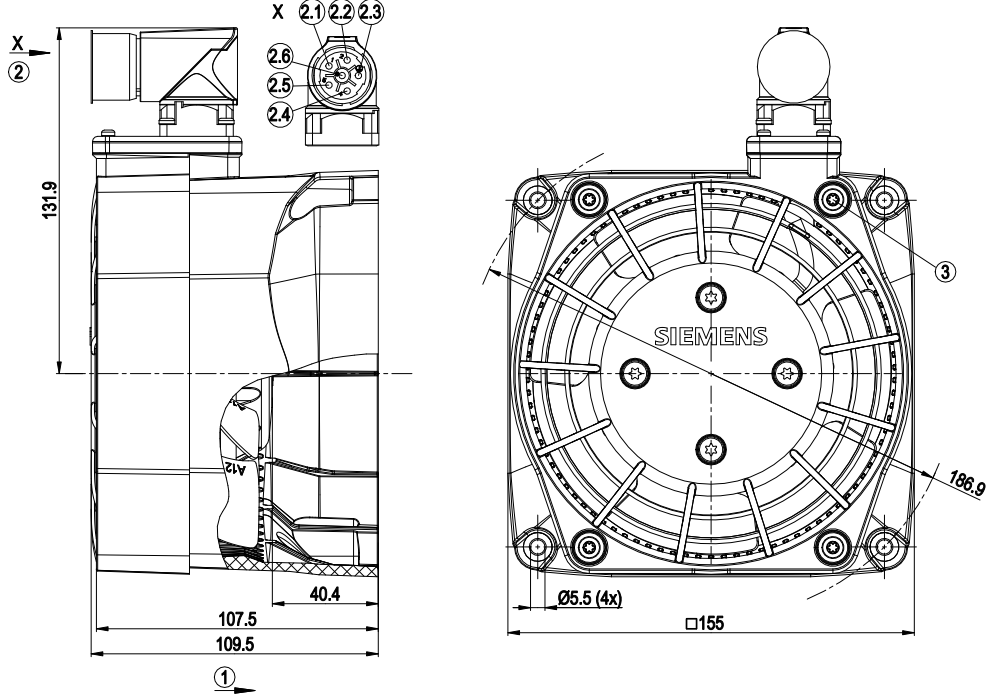


W2S135-FB59-12

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Airflow direction "V"
2	6-pole connector housing consisting of TE 923 22.362.31, TE 40.A079.00, TE 40.A080.00
X	View without cap
2.1	L1 (blue)
2.2	not used
2.3	PE (green/yellow)
2.4	not used
2.5	not used
2.6	L2 (brown)
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand

Translation of the original operating instructions



W2S135-FB59-12

Operating instructions

3.2 Nominal data

Motor	M2S052-CA	
Phase	2~	2~
Nominal voltage / VAC	400	400
Frequency / Hz	50	60
Method of obtaining data	ce	ce
Valid for approval/standard	CE	CE
Speed (rpm) / min ⁻¹	2750	3150
Power consumption / W	44	41
Current draw / A	0.17	0.14
Min. ambient temperature / °C	-25	-25
Max. ambient temperature / °C	60	70
Starting current / A	0.25	0.22

ml = Max. load · me = Max. efficiency · fa = Free air
 cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

340-440 V 50/60 Hz: 0.22A/0.17A

3.3 Technical description

Size	135 mm
Motor size	52
Rotor surface	Painted black
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	A
Direction of rotation	Clockwise, viewed toward rotor
Degree of protection	IP65
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
Electrical hookup	Plug
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1, motor not provided with overheating protection at the factory; CE
Approval	UL 1004-1; EAC; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

For screw clearance, see Chapter 3.1 Product drawing

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2S135-FB59-12

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging

Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

→ Check the device for transport damage. Damaged devices are not to be installed.

→ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device

Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The fan is a built-in component and has no disconnecting switch.

→ Only connect the fan to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the fan, secure the system/machine in which the fan is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

→ Check whether the information on the nameplate matches the connection data.

→ Before connecting the device, make sure the power supply matches the device voltage.

→ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Voltage control



NOTE

Current overshoots may occur if speed control is implemented by transformers or electronic voltage regulators (e.g. phase control). Depending on the type of installation of the device, noise and vibration may also occur in the case of phase control. Vibration can lead to bearing damage and thus premature failure.

Heating-up of the motor when using voltage control must be checked by the customer following installation in the end device.

4.2.3 Variable frequency drive

Please use a variable frequency drive only after consultation with ebmpapst.



For operation with variable frequency drives, install sinusoidal filters that work on all poles (phase-phase and phase-ground) between the drive and the motor.

During operation with variable frequency drives, an all-pole sine filter protects the motor against high-voltage transients that can destroy the coil insulation system, and against harmful bearing currents.

Heating-up of the motor when using a variable frequency drive must be checked by the customer following installation in the end device.



W2S135-FB59-12

Operating instructions

4.3 Plug connection

4.3.1 Making supply connections

- ⇒ Check your connector's pin assignment.
- ⇒ Connect the built-in connector with the mating connector.
- ⇒ Ensure that the connector is properly engaged.

4.3.2 Motor protection

**WARNING****Device has no overheating protection**

The device is supplied without any automatic overheating protection. The device can become hot and catch fire.

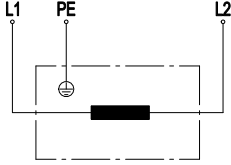
- For the version without thermal overload protector, also install a suitable motor protection switch.



W2S135-FB59-12

Operating instructions

4.4 Connection diagram



L1	blue
PE	green/yellow
L2	brown



W2S135-FB59-12

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check whether the mating connector is properly engaged with the built-in connector.
- ⇒ Check that the mating connector is correctly attached to the cable.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

Do not perform any repairs on your device. Send the device to ebm-papst for repair or replacement.



WARNING
Live terminals and connections even with device switched off
Electric shock

→ Wait five minutes after disconnecting the voltage at all poles before opening the device.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

→ Keep out of the device's danger zone.

→ When working on the device, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2S135-FB59-12

Operating instructions

**DANGER****Risk of injury from rotating fan.**

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE**Damage to the device during cleaning**

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables
Welds for crack formation	Visual inspection	At least every 6 months	Replace device

Abnormal bearing noise	acoustic	At least every 6 months	Replace device
------------------------	----------	-------------------------	----------------

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements**NOTE****Country-specific legal requirements**

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.

**WARNING**

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic.

Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors



W2S135-FB59-12

Operating instructions

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.

Translation of the original operating instructions



A.4 SH 100 model harici fanın işletme kılavuzu

A.4.1 W2D155FA0806 model harici fanın işletme kılavuzu

W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG
Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Connection in terminal box	6
4.4 Connection diagram	8
4.5 Checking connections	9
4.6 Switching on the device	9
4.7 Switching off the device	9
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	9
5.1 Cleaning	9
5.2 Safety inspection	10
5.3 Disposal	10

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER
Electrically charged device
Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

- The rotor and the impeller have basic insulation.
- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

- Risk of injury
- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER
Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices. If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER
Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

- Risk of noise-induced hearing loss
- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.
- ⇒ Make sure that all cable glands are fitted with dummy plugs.



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

2. INTENDED USE

Intended use also includes

- Using the device only in power systems with grounded neutral (TN/TT power systems).
- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Opening the terminal box during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

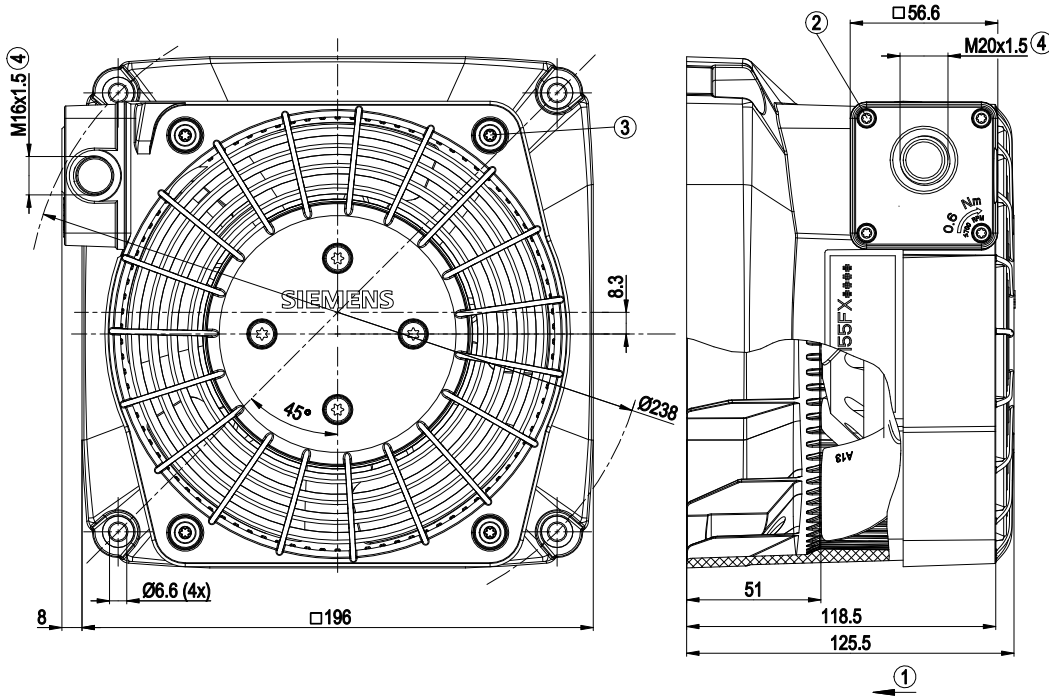


W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Direction of air flow "A"
2	Tightening torque 0.6±0.1 Nm, fit manually
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand
4	Max. screw-in depth 9 mm

Translation of the original operating instructions



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

3.2 Nominal data

Motor	M2D068-BC		
Phase	3~	3~	3~
Nominal voltage / VAC	400	400	480
Wiring	Y	Y	Y
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min⁻¹	2650	2900	3100
Power consumption / W	35	41	51
Current draw / A	0.08	0.07	0.09
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	80	80	80
Starting current / A	0.19	0.19	0.21

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:
340-440 V 50/60 Hz: 0.08 A/0.07 A
408-528 V 60 Hz: 0.11 A

3.3 Technical description

Weight	1.94 kg
Size	155 mm
Motor size	68
Rotor surface	Painted black
Terminal box material	PA plastic
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	5
Airflow direction	A
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP55
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
with cable	Lateral
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1; CE
Approval	UL 1004-1; EAC; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
---------------------------------	-----

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging
Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

⇒ For a M20x1.5 cable gland, measure the maximum cable cross-section of 2.5 mm² and for a M16x1.5 cable gland the maximum cable cross-section of 1.5 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Connection in terminal box

4.3.1 Preparing cables for connection

Only strip the cable as far as necessary, ensuring that the cable gland is sealed and there is no strain on the connections. For tightening torques, see Chapter 3.1 Product drawing.



NOTE

Tightness and strain relief are dependent on the cable used.

→ This must be checked by the user.

⇒ When connecting, make sure the ground conductor is longer than the phase conductors.



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

4.3.2 Connecting wires to terminals

- ⇒ To ensure the IP protection, a cable gland with seal must be used for the cable entry.
- ⇒ Only use cable glands made of plastic.
- ⇒ Route the cables into the intended openings on the terminal box.
- ⇒ First connect the "PE" (protective earth).

An external ground connection can also be made at uninsulated points on the housing or using the external ground connection in the terminal box.

- ⇒ Connect the wires to the corresponding terminals.

Use a screwdriver to do so.

When connecting, ensure that no wire ends fan out.

- ⇒ Insert the leads until they meet resistance.
- ⇒ The cable bushing to the add-on device must be free of burrs and in accordance with the degree of protection (IP code).

4.3.3 Cable routing

Water must be prevented from reaching the cable gland along the cable.



NOTE

Damage caused by moisture penetration.

Moisture can penetrate into the terminal box if water is constantly present at the cable glands.

- To prevent the constant accumulation of water at the cable glands, the cable should be routed in a U-shaped loop wherever possible.
- If this is not possible, a drip edge can be produced by fitting a cable tie directly in front of the cable gland for example.

- Make sure the cable is routed in a U-shaped loop.

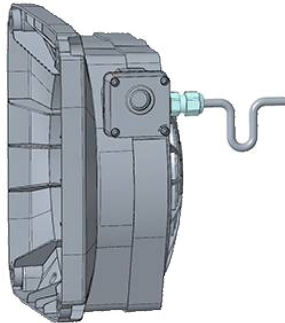


Fig. 1: Cable routing in U-shaped loop

4.3.4 Motor protection

Motor protection switch



WARNING

Device has no locked-rotor protection

As delivered, the forced-ventilation unit has no automatic protection against incorrect operation (locked-rotor protection). The device can become hot and catch fire.

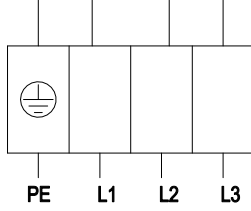
- For the version without thermal overload protector, also install a suitable motor protection switch or a suitable tripping unit for the PTC thermistor.



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

4.4 Connection diagram



PE	green/yellow
L1	black
L2	blue
L3	brown



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check the cables for proper fit.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).
- ⇒ Screw the terminal box cover back on again. Terminal box tightening torque, see Chapter 3.1 Product drawing.
- ⇒ Make sure the terminal box is completely closed and sealed and that all screws and cable glands have been properly tightened.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions



DANGER

Risk of injury from rotating fan.

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE

Damage to the device during cleaning

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. # Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Tightness of cable gland	Visual inspection	At least every 6 months	Retighten, replace if damaged
Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements



NOTE

Country-specific legal requirements

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.



WARNING

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic.

Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards



W2D155-FA08-06
Siemens AG DF MC MF-M

Operating instructions

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



A.4.2 W2D155FA0808 model harici fanın işletme kılavuzu

W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG
Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Connection in terminal box	6
4.4 Connection diagram	8
4.5 Checking connections	9
4.6 Switching on the device	9
4.7 Switching off the device	9
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	9
5.1 Cleaning	9
5.2 Safety inspection	10
5.3 Disposal	10

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER **Electrically charged device**

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

- The rotor and the impeller have basic insulation.
- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER **Guard missing and guard not functioning**

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices. If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER **Rotating device**

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.
- ⇒ Make sure that all cable glands are fitted with dummy plugs.



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

2. INTENDED USE

Intended use also includes

- Using the device only in power systems with grounded neutral (TN/TT power systems).
- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Opening the terminal box during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions



Operating instructions

3.1 Product drawing



1	Direction of air flow "A"
2	Tightening torque 0.6 ± 0.1 Nm, fit manually
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand
4	Max. screw-in depth 9 mm

W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

3.2 Nominal data

Motor	M2D068-BC		
Phase	3~	3~	3~
Nominal voltage / VAC	400	400	480
Wiring	Y	Y	Y
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2650	2900	3100
Power consumption / W	35	41	51
Current draw / A	0.08	0.07	0.09
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	80	80	80
Starting current / A	0.19	0.19	0.21

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:
340-440 V 50/60 Hz: 0.08 A/0.07 A
408-528 V 60 Hz: 0.11 A

3.3 Technical description

Weight	1.98 kg
Size	155 mm
Motor size	68
Rotor surface	Painted black
Terminal box material	PA plastic
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	5
Airflow direction	A
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP65
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
with cable	Lateral
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging
Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device
If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation
Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage
The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

⇒ For a M20x1.5 cable gland, measure the maximum cable cross-section of 2.5 mm² and for a M16x1.5 cable gland the maximum cable cross-section of 1.5 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Connection in terminal box

4.3.1 Preparing cables for connection

Only strip the cable as far as necessary, ensuring that the cable gland is sealed and there is no strain on the connections. For tightening torques, see Chapter 3.1 Product drawing.



NOTE

Tightness and strain relief are dependent on the cable used.

→ This must be checked by the user.

⇒ When connecting, make sure the ground conductor is longer than the phase conductors.



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

4.3.2 Connecting wires to terminals

- ⇒ To ensure the IP protection, a cable gland with seal must be used for the cable entry.
- ⇒ Only use cable glands made of plastic.
- ⇒ Route the cables into the intended openings on the terminal box.
- ⇒ First connect the "PE" (protective earth).

An external ground connection can also be made at uninsulated points on the housing or using the external ground connection in the terminal box.

- ⇒ Connect the wires to the corresponding terminals.

Use a screwdriver to do so.

When connecting, ensure that no wire ends fan out.

- ⇒ Insert the leads until they meet resistance.
- ⇒ The cable bushing to the add-on device must be free of burrs and in accordance with the degree of protection (IP code).

4.3.3 Cable routing

Water must be prevented from reaching the cable gland along the cable.



NOTE

Damage caused by moisture penetration.

Moisture can penetrate into the terminal box if water is constantly present at the cable glands.

- To prevent the constant accumulation of water at the cable glands, the cable should be routed in a U-shaped loop wherever possible.
- If this is not possible, a drip edge can be produced by fitting a cable tie directly in front of the cable gland for example.

- Make sure the cable is routed in a U-shaped loop.

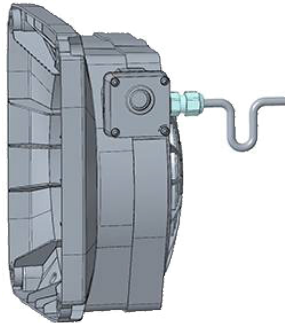


Fig. 1: Cable routing in U-shaped loop

4.3.4 Motor protection

Motor protection switch



WARNING

Device has no locked-rotor protection

As delivered, the forced-ventilation unit has no automatic protection against incorrect operation (locked-rotor protection). The device can become hot and catch fire.

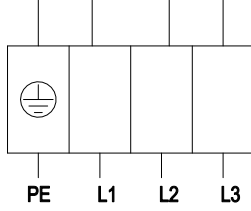
- For the version without thermal overload protector, also install a suitable motor protection switch or a suitable tripping unit for the PTC thermistor.



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

4.4 Connection diagram



PE	green/yellow
L1	black
L2	blue
L3	brown



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check the cables for proper fit.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).
- ⇒ Screw the terminal box cover back on again. Terminal box tightening torque, see Chapter 3.1 Product drawing.
- ⇒ Make sure the terminal box is completely closed and sealed and that all screws and cable glands have been properly tightened.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

→ Keep out of the device's danger zone.

→ When working on the device, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions



DANGER

Risk of injury from rotating fan.

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE

Damage to the device during cleaning

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Tightness of cable gland	Visual inspection	At least every 6 months	Retighten, replace if damaged
Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements



NOTE

Country-specific legal requirements

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.



WARNING

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic.

Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards



W2D155-FA08-08
Siemens AG DF MC MF-M

Operating instructions

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



A.4.3 W2D155FB0805 model harici fanın işletme kılavuzu

W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG
Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Connection in terminal box	6
4.4 Connection diagram	8
4.5 Checking connections	9
4.6 Switching on the device	9
4.7 Switching off the device	9
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	9
5.1 Cleaning	9
5.2 Safety inspection	10
5.3 Disposal	10

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER
Electrically charged device
Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

- The rotor and the impeller have basic insulation.
- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

- Risk of injury
- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER
Guard missing and guard not functioning

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices. If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER
Rotating device

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

- Risk of noise-induced hearing loss
- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.
- ⇒ Make sure that all cable glands are fitted with dummy plugs.



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

2. INTENDED USE

Intended use also includes

- Using the device only in power systems with grounded neutral (TN/TT power systems).
- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Opening the terminal box during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions

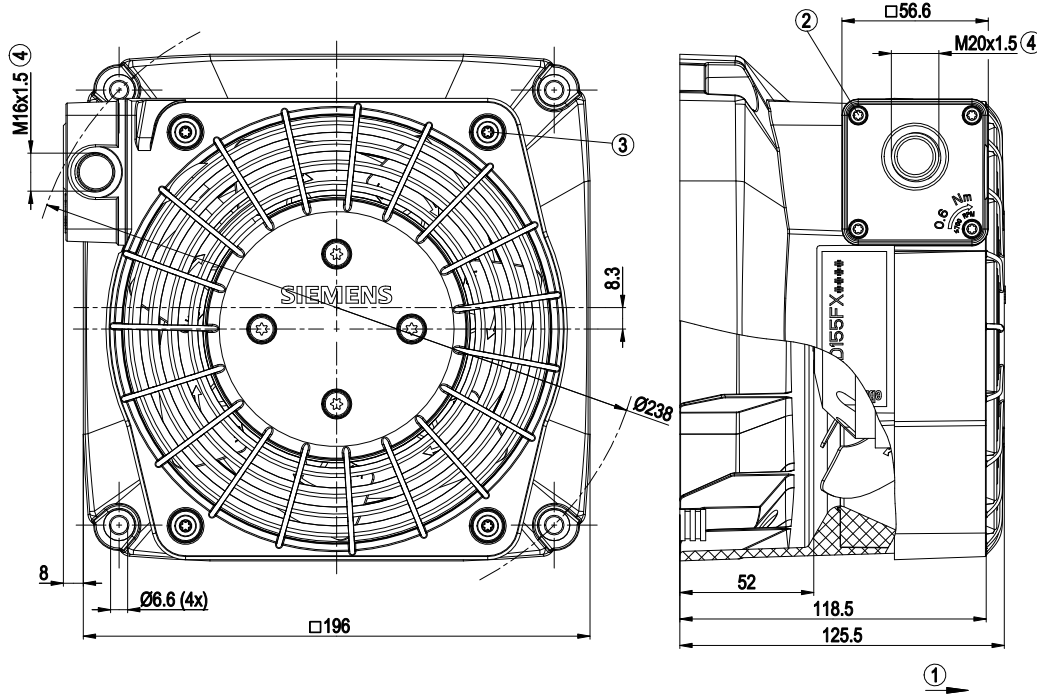


W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

3. TECHNICAL DATA

3.1 Product drawing



All dimensions in mm.

1	Airflow direction "V"
2	Tightening torque 0.6±0.1 Nm, fit manually
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand
4	Max. screw-in depth 9 mm

Translation of the original operating instructions



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

3.2 Nominal data

Motor	M2D068-BC		
Phase	3~	3~	3~
Nominal voltage / VAC	400	400	480
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2800	3200	3300
Power consumption / W	27	29	37
Current draw / A	0.08	0.06	0.08
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	80	80	80
Starting current / A	0.19	0.19	0.21

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

340-440 V 50/60 Hz: 0.1A/0.08A

408-528 V 60 Hz: 0.11 A

3.3 Technical description

Weight	2.02 kg
Size	155 mm
Motor size	68
Rotor surface	Painted black
Terminal box material	PA plastic
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	V
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP55
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
with cable	Lateral
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging

Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration

Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device

Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation

Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

⇒ For a M20x1.5 cable gland, measure the maximum cable cross-section of 2.5 mm² and for a M16x1.5 cable gland the maximum cable cross-section of 1.5 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Connection in terminal box

4.3.1 Preparing cables for connection

Only strip the cable as far as necessary, ensuring that the cable gland is sealed and there is no strain on the connections. For tightening torques, see Chapter 3.1 Product drawing.



NOTE

Tightness and strain relief are dependent on the cable used.

→ This must be checked by the user.

⇒ When connecting, make sure the ground conductor is longer than the phase conductors.



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

4.3.2 Connecting wires to terminals

- ⇒ To ensure the IP protection, a cable gland with seal must be used for the cable entry.
- ⇒ Only use cable glands made of plastic.
- ⇒ Route the cables into the intended openings on the terminal box.
- ⇒ First connect the "PE" (protective earth).

An external ground connection can also be made at uninsulated points on the housing or using the external ground connection in the terminal box.

- ⇒ Connect the wires to the corresponding terminals.

Use a screwdriver to do so.

When connecting, ensure that no wire ends fan out.

- ⇒ Insert the leads until they meet resistance.
- ⇒ The cable bushing to the add-on device must be free of burrs and in accordance with the degree of protection (IP code).

4.3.3 Cable routing

Water must be prevented from reaching the cable gland along the cable.



NOTE

Damage caused by moisture penetration.

Moisture can penetrate into the terminal box if water is constantly present at the cable glands.

- To prevent the constant accumulation of water at the cable glands, the cable should be routed in a U-shaped loop wherever possible.
- If this is not possible, a drip edge can be produced by fitting a cable tie directly in front of the cable gland for example.

- Make sure the cable is routed in a U-shaped loop.

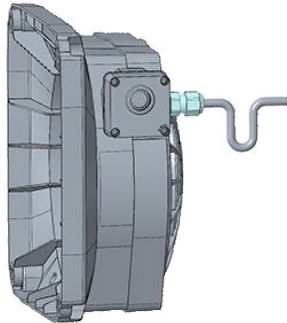


Fig. 1: Cable routing in U-shaped loop

4.3.4 Motor protection

Motor protection switch



WARNING

Device has no locked-rotor protection

As delivered, the forced-ventilation unit has no automatic protection against incorrect operation (locked-rotor protection). The device can become hot and catch fire.

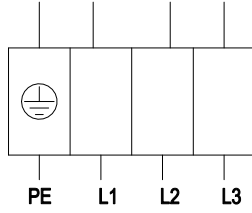
- For the version without thermal overload protector, also install a suitable motor protection switch or a suitable tripping unit for the PTC thermistor.



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

4.4 Connection diagram



PE	green/yellow
L1	black
L2	blue
L3	brown



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check the cables for proper fit.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).
- ⇒ Screw the terminal box cover back on again. Terminal box tightening torque, see Chapter 3.1 Product drawing.
- ⇒ Make sure the terminal box is completely closed and sealed and that all screws and cable glands have been properly tightened.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

→ Keep out of the device's danger zone.

→ When working on the device, switch off the line voltage and ensure that it cannot be switched back on.

→ Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions



DANGER

Risk of injury from rotating fan.

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE

Damage to the device during cleaning

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Tightness of cable gland	Visual inspection	At least every 6 months	Retighten, replace if damaged
Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements



NOTE

Country-specific legal requirements

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.



WARNING

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic.

Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards



W2D155-FB08-05
Siemens AG DF MC MF-M

Operating instructions

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



A.4.4 W2D155FB0807 model harici fanın işletme kılavuzu

W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

ebm-papst Mulfingen GmbH & Co. KG
Bachmühle 2
D-74673 Mulfingen
Phone +49 (0) 7938 81-0
Fax +49 (0) 7938 81-110
info1@de.ebmpapst.com
www.ebmpapst.com

CONTENTS

1. SAFETY REGULATIONS AND INFORMATION	1
1.1 Hazard levels for warnings	1
1.2 Staff qualifications	1
1.3 Basic safety rules	1
1.4 Voltage	2
1.5 Safety and protective features	2
1.6 Electromagnetic radiation	2
1.7 Mechanical movement	2
1.8 Emissions	2
1.9 Hot surface	2
1.10 Transport	2
1.11 Storage	2
2. INTENDED USE	3
3. TECHNICAL DATA	4
3.1 Product drawing	4
3.2 Nominal data	5
3.3 Technical description	5
3.4 Mounting data	5
3.5 Transport and storage conditions	5
4. CONNECTION AND STARTUP	6
4.1 Mechanical connection	6
4.2 Electrical connection	6
4.3 Connection in terminal box	6
4.4 Connection diagram	8
4.5 Checking connections	9
4.6 Switching on the device	9
4.7 Switching off the device	9
5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES	9
5.1 Cleaning	9
5.2 Safety inspection	10
5.3 Disposal	10

1. SAFETY REGULATIONS AND INFORMATION

Read these operating instructions carefully before starting work on the device. Observe the following warnings to prevent malfunctions or danger to persons.

These operating instructions are to be regarded as part of the device. The device is only to be sold or passed on together with the operating instructions.

These operating instructions may be duplicated and distributed to inform about potential dangers and their prevention.

1.1 Hazard levels for warnings

These operating instructions use the following hazard levels to indicate potentially hazardous situations and important safety regulations:



DANGER

Indicates an imminently hazardous situation which will result in death or serious injury if the specified actions are not taken. Compliance with the instructions is imperative.

WARNING

Indicates a potentially hazardous situation which can result in death or serious injury if the specified actions are not taken. Exercise extreme caution while working.

CAUTION

Indicates a potentially hazardous situation which can result in minor or moderate injury or damage to property if the specified actions are not taken.

NOTE

A potentially harmful situation can occur and, if not avoided, can lead to property damage.

1.2 Staff qualifications

The device may only be transported, unpacked, installed, operated, maintained and otherwise used by suitably qualified, trained and authorized technical staff.

Only authorized specialists are permitted to install the device, to carry out a test run and to perform work on the electrical installation.

1.3 Basic safety rules

The motor may only be operated with an impeller. The result is a motor-fan combination. Motor and impeller assignment may only be done by ebm-papst.

Protection against such things as:

- electric shock
- Contact with rotating parts
- Ingress of foreign bodies or moisture
- Excessive condensation

The safety hazards associated with the device must be assessed again following installation in the final product.

The locally applicable industrial safety regulations are always to be observed when working on the device.

Keep the workplace clean and tidy. Untidiness in the work area increases the risk of accidents.

Note the following when working on the device:

- ⇒ Do not perform any modifications, additions or conversions on the device without the approval of ebm-papst.



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

1.4 Voltage

- ⇒ Check the device's electrical equipment at regular intervals; see Chapter 5.2 Safety inspection.
- ⇒ Replace loose connections and defective cables immediately.



DANGER **Electrically charged device**

Risk of electric shock

- When working on an electrically charged device, stand on a rubber mat.

CAUTION

In the event of a fault, the rotor and the impeller will be energized

- The rotor and the impeller have basic insulation.
- Do not touch the rotor and impeller once installed.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.

1.5 Safety and protective features



DANGER **Guard missing and guard not functioning**

Without a guard, hands may become caught up in the device during operation for example, resulting in serious injury. Loose parts or items of clothing could be drawn in.

- The device is a built-in component. As the owner, you are responsible for ensuring that the device is adequately safeguarded. Operate the device only with a fixed protective device and guard grill.
- Stop the device immediately if a protective device is found to be missing or ineffective.

1.6 Electromagnetic radiation

Interference from electromagnetic radiation is possible, e.g. in conjunction with open- and closed-loop control devices. If impermissible radiation levels occur following installation, appropriate shielding measures have to be taken by the user.

1.7 Mechanical movement



DANGER **Rotating device**

Risk of injury to body parts coming into contact with the rotor or the impeller.

- Secure the device against accidental contact.
- Before working on the system/machine, wait until all parts have come to a standstill.

WARNING

Rotating device

Long hair and dangling items of clothing, jewelry and the like can become entangled and be pulled into the device. Injuries can result.

- Do not wear any loose-fitting or dangling clothing or jewelry while working on rotating parts.
- Protect long hair with a cap.

1.8 Emissions

WARNING

Depending on the installation and operating conditions, the sound pressure level may exceed 70 dB(A).

Risk of noise-induced hearing loss

- Take appropriate technical safety measures.
- Protect operating personnel with appropriate safety equipment such as hearing protection.
- Also observe the requirements of local agencies.

1.9 Hot surface

NOTE

Risk of fire

The risk of fire or flame propagation by ebm-papst products must be assessed by the commissioning party following installation in the final product.

1.10 Transport

NOTE

Transporting the device

- Transport the device in its original packaging only.
- Secure the device so it cannot slip, e.g. by using a lashing strip.

1.11 Storage

- ⇒ Store the device, partially or fully assembled, in a dry place, protected against the weather and free from vibration, in the original packaging in a clean environment.
- ⇒ Protect the device against environmental effects and dirt until final installation.
- ⇒ We recommend storing the device for no longer than one year in order to guarantee trouble-free operation and the longest possible service life.
- ⇒ Even devices explicitly intended for outdoor use are to be stored as described prior to commissioning.
- ⇒ Maintain the storage temperature, see Chapter 3.5 Transport and storage conditions.
- ⇒ Make sure that all cable glands are fitted with dummy plugs.



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

2. INTENDED USE

Intended use also includes

- Using the device only in power systems with grounded neutral (TN/TT power systems).
- Conveying air at an ambient air pressure between 800 mbar and 1050 mbar.
- Using the device within the permitted ambient temperature range; see Chapter 3.5 Transport and storage conditions and Chapter 3.2 Nominal data.
- Operating the device with all protective devices.
- Following the operating instructions.

Improper use

In particular, operating the device in the following ways is prohibited and could be hazardous:

- Operating the device in an unbalanced state, e.g. due to dirt deposits or ice formation.
- Resonant operation, operation with severe vibration. This also includes vibration transmitted to the fan from the customer installation.
- Operation in medical equipment with a life-sustaining or life-support function.
- Conveying solids in the flow medium.
- Painting the device
- Connections (e.g. screws) coming loose during operation.
- Opening the terminal box during operation.
- Conveying air that contains abrasive particles.
- Conveying highly corrosive air, e.g. salt spray. Exception: devices designed for salt spray and correspondingly protected.
- Conveying air with high dust content, e.g. suctioning off sawdust.
- Operating the device close to flammable materials or components.
- Operating the device in an explosive atmosphere.
- Using the device as a safety component or to perform safety-related functions.
- Operation with completely or partially disassembled or manipulated protective devices.
- In addition, all applications not listed among the intended uses.

Translation of the original operating instructions



Operating instructions

3.1 Product drawing



1	Airflow direction "V"
2	Tightening torque 0.6 ± 0.1 Nm, fit manually
3	Tightening torque 3.5 ± 0.3 Nm; fit screws by hand
4	Max. screw-in depth 9 mm

W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

3.2 Nominal data

Motor	M2D068-BC		
Phase	3~	3~	3~
Nominal voltage / VAC	400	400	480
Frequency / Hz	50	60	60
Method of obtaining data	ce	ce	ce
Valid for approval/standard	CE	CE	CE
Speed (rpm) / min ⁻¹	2800	3200	3300
Power consumption / W	27	29	37
Current draw / A	0.08	0.06	0.08
Min. ambient temperature / °C	-25	-25	-25
Max. ambient temperature / °C	80	80	80
Starting current / A	0.19	0.19	0.21

ml = Max. load · me = Max. efficiency · fa = Free air
cs = Customer specification · ce = Customer equipment

Subject to change

Imax:

340-440 V 50/60 Hz: 0.1A/0.08A

408-528 V 60 Hz: 0.11 A

3.3 Technical description

Weight	2.08 kg
Size	155 mm
Motor size	68
Rotor surface	Painted black
Terminal box material	PA plastic
Impeller material	Sheet steel, painted black
Housing material	PA plastic
Number of blades	7
Airflow direction	V
Direction of rotation	Counterclockwise, viewed toward rotor
Degree of protection	IP65
Insulation class	"F"
Moisture (F) / Environmental (H) protection class	H1+
Installation position	Any
Condensation drainage holes	None
Mode	S1
Motor bearing	Ball bearing
Touch current according to IEC 60990 (measuring circuit Fig. 4, TN system)	< 0.75 mA
with cable	Lateral
Protection class	I (with customer connection of protective earth)
Conformity with standards	EN 60034-1; EN 60204-1; EN 60335-1; CE
Approval	EAC; UL 1004-1; CSA C22.2 No. 100



With regard to cyclic speed loads, note that the rotating parts of the device are designed for a maximum of one million load cycles. If you have special questions, consult ebm-papst for support.

⇒ Use the device in accordance with its degree of protection.

Information on surface quality

The surfaces of the products conform to the generally applicable industrial standard. The surface quality may change during the production period. This has no effect on strength, dimensional stability and dimensional accuracy.

The color pigments in the paints used perceptibly react to UV light over the course of time. The product is to be protected against UV radiation to prevent the formation of patches and fading. Changes in color are not a reason for complaint and are not covered by the warranty. UV radiation in the frequency range and the intensity of natural solar radiation has no effect on the technical properties of the products.

3.4 Mounting data

Any further mounting data required can be taken from the product drawing or Section Chapter 4.1 Mechanical connection.

Strength class of screws	8.8
--------------------------	-----

⇒ Secure the screws against unintentional loosening (e.g. use self-locking screws).

3.5 Transport and storage conditions

NOTE

The degree of protection is only valid in conjunction with the main motor.

Max. permitted ambient temp. for motor (transport/storage)	+80 °C
Min. permitted ambient temp. for motor (transport/storage)	-40 °C

Translation of the original operating instructions



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

4. CONNECTION AND STARTUP

4.1 Mechanical connection



CAUTION
Cutting and crushing hazard when removing device from packaging
Blades can bend

→ Carefully remove the device from its packaging, by the fan housing. Strictly avoid shocks.

→ Wear safety shoes and cut-resistant safety gloves.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

→ The fan must not be subjected to force or excessive vibration from sections of the installation.

→ If the fan is connected to air ducts, the connection should be isolated from vibration, e.g. using compensators or similar elements.

→ Ensure stress-free attachment of the fan to the substructure.

⇒ Check the device for transport damage. Damaged devices are not to be installed.

⇒ Install the undamaged device in accordance with your application.



CAUTION
Possible damage to the device

If the device slips during installation, serious damage can result.

→ Ensure that the device is securely positioned at its place of installation until all fastening screws have been tightened.

- The fan must not be strained on fastening.

4.2 Electrical connection



DANGER
Voltage on the device
Electric shock

→ Always connect a protective earth first.

→ Check the protective earth.



DANGER
Faulty insulation
Risk of fatal injury from electric shock

→ Use only cables that meet the specified installation regulations for voltage, current, insulation material, capacity, etc.

→ Route cables so that they cannot be touched by any rotating parts.

CAUTION

Voltage

The device is a built-in component and has no disconnecting switch.

→ Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

→ When working on the device, secure the system/machine in which the device is installed so as to prevent it from being switched back on.

NOTE

Water ingress into wires or cables

Water ingress at the customer end of the cable can damage the device.

→ Make sure the end of the cable is connected in a dry environment.



Only connect the device to circuits that can be switched off with an all-pole disconnection switch.

4.2.1 Requirements

⇒ Check whether the information on the nameplate matches the connection data.

⇒ Before connecting the device, make sure the power supply matches the device voltage.

⇒ Only use cables designed for the current level indicated on the nameplate.

For determining the cross-section, note the sizing criteria according to EN 61800-5-1. The protective earth must have a cross-section equal to or greater than that of the phase conductor.

We recommend the use of 105 °C cables. Ensure that the minimum cable cross-section is at least AWG 26 / 0.13 mm².

⇒ For a M20x1.5 cable gland, measure the maximum cable cross-section of 2.5 mm² and for a M16x1.5 cable gland the maximum cable cross-section of 1.5 mm².

Forced-ventilation units with no thermal overload protector must be safeguarded by a motor circuit breaker prior to startup.

Protective earth contact resistance according to EN 60335

Compliance with the resistance specifications according to EN 60335 for the protective earth connection circuit must be verified in the end application. Depending on the installation situation, it may be necessary to connect an additional protective earth conductor by way of the extra protective earth terminal provided on the device.

4.2.2 Residual current circuit breaker (RCCB)



If the use of a residual current device (RCD) is required in your installation, only AC/DC-sensitive residual current devices of type B are permissible.

4.3 Connection in terminal box

4.3.1 Preparing cables for connection

Only strip the cable as far as necessary, ensuring that the cable gland is sealed and there is no strain on the connections. For tightening torques, see Chapter 3.1 Product drawing.



NOTE

Tightness and strain relief are dependent on the cable used.

→ This must be checked by the user.

⇒ When connecting, make sure the ground conductor is longer than the phase conductors.



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

4.3.2 Connecting wires to terminals

- ⇒ To ensure the IP protection, a cable gland with seal must be used for the cable entry.
- ⇒ Only use cable glands made of plastic.
- ⇒ Route the cables into the intended openings on the terminal box.
- ⇒ First connect the "PE" (protective earth).

An external ground connection can also be made at uninsulated points on the housing or using the external ground connection in the terminal box.

- ⇒ Connect the wires to the corresponding terminals.

Use a screwdriver to do so.

When connecting, ensure that no wire ends fan out.

- ⇒ Insert the leads until they meet resistance.
- ⇒ The cable bushing to the add-on device must be free of burrs and in accordance with the degree of protection (IP code).

4.3.3 Cable routing

Water must be prevented from reaching the cable gland along the cable.



NOTE

Damage caused by moisture penetration.

Moisture can penetrate into the terminal box if water is constantly present at the cable glands.

- To prevent the constant accumulation of water at the cable glands, the cable should be routed in a U-shaped loop wherever possible.
- If this is not possible, a drip edge can be produced by fitting a cable tie directly in front of the cable gland for example.

- Make sure the cable is routed in a U-shaped loop.

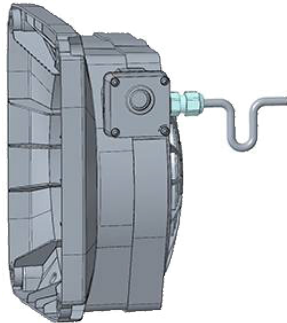


Fig. 1: Cable routing in U-shaped loop

4.3.4 Motor protection

Motor protection switch



WARNING

Device has no locked-rotor protection

As delivered, the forced-ventilation unit has no automatic protection against incorrect operation (locked-rotor protection). The device can become hot and catch fire.

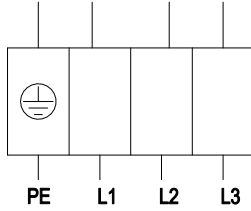
- For the version without thermal overload protector, also install a suitable motor protection switch or a suitable tripping unit for the PTC thermistor.



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

4.4 Connection diagram



PE	green/yellow
L1	black
L2	blue
L3	brown



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

4.5 Checking connections

- ⇒ Ensure isolation from supply (all phases).
- ⇒ Make sure a restart is impossible
- ⇒ Check the cables for proper fit.
- ⇒ Check the mechanical and electrical installation of safety-related components (e.g. motor protection switch, guard grille etc.).
- ⇒ Screw the terminal box cover back on again. Terminal box tightening torque, see Chapter 3.1 Product drawing.
- ⇒ Make sure the terminal box is completely closed and sealed and that all screws and cable glands have been properly tightened.

4.6 Switching on the device

The device may only be switched on if it has been installed properly and in accordance with its intended use, including the required safety mechanisms and professional electrical hookup. This also applies for devices which have already been equipped with plugs and terminals or similar connectors by the customer.



WARNING
Hot motor housing
Risk of fire

→ Ensure that no combustible or flammable materials are located close to the fan.

- ⇒ Before switching on, check the device for visible external damage and make sure the protective devices are functional.
- ⇒ Check the fan's air flow paths for foreign matter and remove any foreign matter found.
- ⇒ Apply the nominal supply voltage.



NOTE
Damage to the device from vibration
Bearing damage, shorter service life

- Low-vibration operation of the fan must be ensured over the entire speed control range.
- Severe vibration can arise for instance from inexpert handling, transportation damage and resultant imbalance or be caused by component or structural resonance.
- Speed ranges with excessively high vibration levels and possibly resonant frequencies must be determined in the course of fan commissioning.
- Either run through the resonant range as quickly as possible with speed control or find another remedy.
- Operation with excessively high vibration levels can lead to premature failure.

4.7 Switching off the device

- ⇒ Disconnect the device from the power supply at the supply line's main switch.
- ⇒ When disconnecting, be sure to disconnect the ground connection last.

5. MAINTENANCE, MALFUNCTIONS, POSSIBLE CAUSES AND REMEDIES

The fan in the forced-ventilation unit is maintenance-free thanks to the use of special bearing greases.

During maintenance work on the ventilation unit, e.g. when cleaning the fan blades, the fan must be stationary and the ventilation unit's electrical circuit must be interrupted and secured against being switched on again.

CAUTION

The motor restarts automatically when operating voltage is applied, e.g. after a power failure.

Risk of injury

- Keep out of the device's danger zone.
- When working on the device, switch off the line voltage and ensure that it cannot be switched back on.
- Wait until the device comes to a stop.



If the device is out of use for some time, e.g. when in storage, we recommend switching it on for at least two hours to allow any condensation to evaporate and to move the bearings.

- ⇒ Do not perform any repairs on the forced-ventilation unit. Send the blower to ebm-papst for repair or replacement.

Malfunction/fault	Possible cause	Possible remedy
Impeller not running smoothly	Imbalance in rotating parts	Clean the device; replace it if imbalance persists after cleaning. Make sure no weight clips are removed during cleaning.
Motor not turning	Mechanical blockage	Switch off, isolate from supply and remove mechanical blockage.
	Line voltage faulty	Check line voltage, restore power supply.
	Faulty connection	Isolate from supply, correct connection; see connection diagram.
	Broken motor winding	Replace device
	Impermissible point of operation	Check point of operation
Motor overtemperature	Ambient temperature too high	Reduce ambient temperature if possible
	Deficient cooling	Improve cooling



In the event of further malfunctions, contact ebm-papst.

5.1 Cleaning

To ensure a long service life, check the fans regularly for proper operation and soiling. The frequency of checking is to be adapted accordingly depending on the degree of soiling.



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions



DANGER

Risk of injury from rotating fan.

→ Only clean when not in motion. Interrupt the power supply, secure against renewed switch-on. Secure against start-up, prevent air flow.

- ⇒ Dirt deposits on the motor housing can cause overheating of the motor.
- ⇒ Soiling of the impeller can cause vibration that will shorten the service life of the fan.
- ⇒ Severe vibration can destroy the fan.
- ⇒ In such cases, switch off the fan immediately and clean it.
- ⇒ The preferred method of cleaning is dry cleaning, e.g. using compressed air.
- ⇒ Do not use aggressive cleaning agents!

NOTE

Damage to the device during cleaning

Malfunction possible

→ Do not clean the device using a high-pressure cleaner. Do not use acid, alkali or solvent-based cleaning agents.

→ Do not use any pointed or sharp-edged objects for cleaning.

- ⇒ Clean the fan using a suitable cloth or brush, taking care not to allow moisture to reach the motor's interior.
- ⇒ Take care not to damage or bend the fan blades.
- ⇒ Completely remove any cleaning agents used.
- ⇒ If severe corrosion is visible on load-bearing or rotating parts, switch off the device immediately and replace it.
- ⇒ Repair of load-bearing or rotating parts is not permitted!
- ⇒ Operate the fan for 2 hours at maximum speed so that any water that has ingressed can evaporate.
- ⇒ If cleaning does not eliminate vibrations, the fan may need to be rebalanced. To have it rebalanced, contact ebm-papst.
- ⇒ The fan is equipped with maintenance-free ball bearings. The lifetime lubrication of the ball bearings is designed for a service life of 40,000 hours.
- ⇒ If bearing replacement is necessary after that period, contact ebm-papst.
- ⇒ Adapt the maintenance intervals to the actual level of dust exposure.

5.2 Safety inspection

What to check	How to check	How often	What action?
Contact protection cover for intactness or damage	Visual inspection	At least every 6 months	Repair or replacement of device
Device for damage to blades and housing	Visual inspection	At least every 6 months	Replacement of device
Fastening the cables	Visual inspection	At least every 6 months	Fasten
Fastening the protective earth terminal	Visual inspection	At least every 6 months	Fasten
Insulation of cables for damage	Visual inspection	At least every 6 months	Replace cables

Tightness of cable gland	Visual inspection	At least every 6 months	Retighten, replace if damaged
Welds for crack formation	Visual inspection	At least every 6 months	Replace device
Distance between impeller and housing or plastic ring	Measurement	At least every 6 months	Replace device
Insulation resistance check	Measurement	Following completion of electrical work	Replace device
Abnormal bearing noise	acoustic	At least every 6 months	Replace device

5.3 Disposal

For ebm-papst, environmental protection and resource preservation are top priority corporate goals.

ebm-papst operates an environmental management system which is certified in accordance with ISO 14001 and rigorously implemented around the world on the basis of German standards.

Right from the development stage, ecological design, technical safety and health protection are fixed criteria.

The following section contains recommendations for ecological disposal of the product and its components.

5.3.1 Country-specific legal requirements



NOTE

Country-specific legal requirements

Always observe the applicable country-specific legal regulations with regard to the disposal of products or waste occurring in the various phases of the life cycle. The corresponding disposal standards are also to be heeded.

5.3.2 Disassembly

Disassembly of the product must be performed or supervised by qualified personnel with the appropriate technical knowledge.

The product is to be disassembled into suitable components for disposal employing standard procedures for motors.



WARNING

Heavy parts of the product may drop off. Some of the product components are heavy. These components could drop off during disassembly.

This can result in fatal or serious injury and material damage.

→ Secure components before unfastening to stop them falling.

5.3.3 Component disposal

The products are mostly made of steel, copper, aluminum and plastic.

Metallic materials are generally considered to be fully recyclable.

Separate the components for recycling into the following categories:

- Steel and iron
- Aluminum
- Non-ferrous metal, e.g. motor windings
- Plastics, particularly with brominated flame retardants, in accordance with marking
- Insulating materials
- Cables and wires
- Electronic scrap, e.g. circuit boards



W2D155-FB08-07
Siemens AG DF MC MF-M

Operating instructions

Only ferrite magnets and not rare earth magnets are used in external rotor motors from ebm-papst Mulfingen GmbH & Co. KG.

⇒ Ferrite magnets can be disposed of in the same way as normal iron and steel.

Electrical insulating materials on the product, in cables and wires are made of similar materials and are therefore to be treated in the same manner.

The materials concerned are as follows:

- Miscellaneous insulators used in the terminal box
- Power cables
- Cables for internal wiring
- Electrolytic capacitors

Dispose of electronic components employing the proper procedures for electronic scrap.



→ Please contact ebm-papst for any other questions on disposal.



Endeks

A

Amacına uygun kullanım, 19
Arızalar, 106
Ayak sabitlemesi, 42

B

Bağlantı, 73
Bağlantı kutusu, 76
Bakım aralığı, 110
Bir vericiyi değiştirme, 117

D

Denetim ve bakım, 110
Dengeleme talimatı (örnek), 52
Dengeleme talimatları (genel), 45
Depolama, 39
Devre şeması, 75
Devreye sokma, 98
DRIVE-CLiQ arabirimini değiştirme, 122
Durdurma freni (seçenek)
 Bağlantı, 92
 Demonte etme, 123
 Montaj, 34, 123
Durdurma frenleri, 31
Düzeltici onarım, 117

E

Eğitimler, 5
Etiket, 25

F

Flanş sabitlemesi, 43

G

Gamma halkası, 118
Gücü uyarılama, 23
Gürültü emisyonları, 24
Güvenlik uyarıları
 Bakım, 109

Devreye alma, 95
Elektrik bağlantısı, 74
İşletim, 106
Montaj, 41
Nakliye, 35

H

Harici havalandırma, 27

K

Kapatma havası bağlantısı, 92
Koruma tarzı, 23

M

Makinenin sabitlenmesi, 42
Motorun işletme molaları, 108

N

Nakliye, 36

O

Ortam koşulları, 22

R

RoHS, 21

S

Sarsıntıya dayanıklılık, 56
Sertifikalar
 EAC, 21
 EG uygunluk beyanı, 21
 UL ve cUL, 21
Sıcaklık algılayıcısının bağlanması, 85
Sıkma torkları
 Ayak/flanş montajı, 43
 Cıvata bağlantıları, 123
 Elektrik bağlantıları, 75
Sökme/takma
 Devir sayısı sensörü, 118

Motor, 118
Pinyon verici, 121
Su soğutması, 28

T

Tahrik çıkış elemanları, 44
Teknik destek
 Acil yardım hattı, (Siemens Service Center)
Temizlik, 110
Tip etiketi, 25
Titreşim büyüklüğü kademesi, 55
Titreşim değerleri, 56
Titreşim karakteristiği, 56

U

Uygulama alanı, 20

Y

Yapılar, 26
Yatak değiştirme süreleri, 112
Yedek parçalar, 125

Siemens AG
Digital Industries
Motion Control
Postfach 31 80
91050 ERLANGEN
Almanya

SIMOTICS ile ilgili
daha fazla bilgi
için QR kodunu
taratın.

